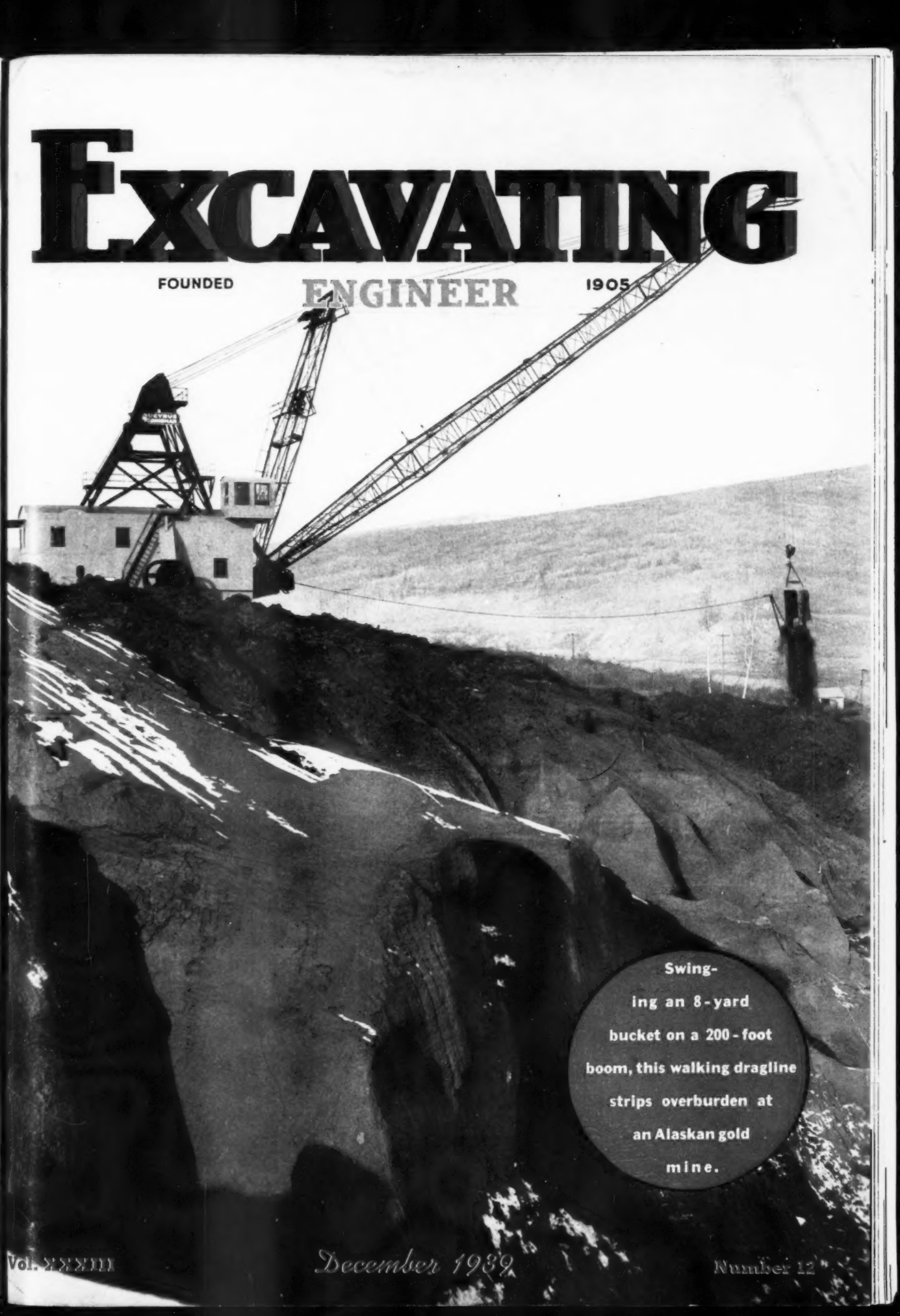
EXCAVATING

FOUNDED ENGINEER 1905



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EXCAVATING ENGINEER

FOUNDED 1905

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SHASTA DAM

Key unit of the great Central Valley Project, Shasta Dam will help California conserve her most precious natural resource — water.

By WILLIAM ALLEN MILLER

SINCE THE discovery of gold in California there has been a steady flow of settlers into the State and this flow has increased until at the present time the centers of population are taxed to their limits trying to provide a livelihood for all. It has long been known that within the boundaries of the State of California is a long, fertile valley that if supplied with sufficient water could become one of the centers of western development.

The valley is known as the Great Central Valley and is approximately 500 miles long and fifty miles wide, with elevation running from sea level to 400 feet. In all, the valley covers 58,150 square miles and has 2,000,000 acres that under proper irrigation could be made productive.

Fulfillment of Many Years' Planning

As early as 1871, men dreamed of the possibilities of this vast, barren region—cattle, crops—not to mention the means of living and support for their families for thousands of men—if only the water that is wasted in floods each year could be conserved and distributed over this area when nature failed them. For a long time, state and federal agencies have worked and improved upon the original plans from year to year until in 1933, by vote of the people, the project was approved as a United States Bureau of Reclamation project, and was signed by President Roosevelt in 1935—today, the vision and dreams of these men is in the process of becoming a reality.

In order for this plan to operate, it was necessary that a dam be built to back up the waters of some large river, and form a reservoir with sufficient capacity to supply the needs at the present time as well as the ever-increasing demands of the future.

About twelve miles north of Redding, on the Sacramento River, the ideal location for such a dam was found. This site had held favor with the State of California many years ago when a plan similar to the present one was started, but due to the magnitude of the project and the lack of sufficient funds to purchase the necessary equipment the plan was shelved. Today, however, such funds and equipment are available and work on the dam is under way under the direct supervision of the most able, experienced dam builders in the country.

Five-fold Benefits of Dam

And so Shasta Dam was conceived. Its major reason for construction, irrigation, is closely followed by four important benefits that will result after the dam's completion. They are the control of the Sacramento river floods, development of electric power, prevention of salt water encroachment, and the stabilization of navigation on the Sacramento river.

Construction of the dam and power house was started in September of 1938 with the award of a $35,939,450 general contract by Secretary of the Interior Harold L. Ickes to the Pacific Constructors, Inc. This syndicate, which was formed to make the bid, is made up of the following 12 companies: Griffith Co., Los Angeles; Metropolitan Construction Co., Los Angeles; Lawler & Maguire of Butte, Montana; The Arundel Corp., Baltimore; American Concrete & Steel Pipe Co., Los Angeles; Foley Bros., New York City; D. W. Thurston, Los Angeles; Shofner, Gordon & Hinman, Denver; W. E. Callahan Co., and Gunther, Shirley Co., Dallas, Texas; A. Guthrie & Co., St. Paul, Minn.; L. E. Dixon Co., Los Angeles; and Hunkin Conkey Co., Cleveland.

The $35,939,450 contract held

● Below: A Bucyrus-Erie 48-B working in heavy rock, loads to a 25-yard White dump truck. Right: Four plumes of smoke mark a blast on the east keyway of the dam.

● Top: An aerial view of the Shasta Dam site indicating the location of the Southern Pacific Railroad by-pass tunnel. Bottom: An upstream view of the dam site showing general topography.

by this syndicate does not include cost of materials which will run to about $65,000,000.

Completed, Shasta Dam will be second in size only to Grand Coulee, world's largest dam. This massive concrete gravity type structure will consist of a central straight spillway section and slightly curved abutment sections. An earth and rock fill embankment will be constructed at the left end of the main concrete portion of the dam. The concrete dam and embankment will be about 3,500 feet in overall length on the crest, and about 560 feet in height from the lowest point of the foundation to the top of the roadway. The foundation will be extensively drilled and blanket-grouted and a main grout cut-off curtain will be formed by drilling holes into the foundation rock, and high-pressure grouting the holes. Foundation drainage will be provided by a series of drilled holes discharging into a foundation gallery and into grouting and drainage tunnels. The concrete of the dam will be divided into blocks or columns

● Below: Ingersoll-Rand wagon drills performing "snake-holing" operations in the east keyway. Right: Large scale digging operations in heavy rock were made possible by four of these 4¾-yard Bucyrus-Erie shovels loading to 25-yard White dump trucks.

● A panorama view of the east Sacramento River bank shortly after the letting of the contract. Note the ruggedness of the brush-covered country side which was soon swarming with men and machines.

by means of vertical contraction joints.

Systems of grout pipes will be embedded in the mass concrete, with outlets into the contraction joints by means of which these joints will be pressure-grouted after the concrete has cooled. Vertical drains of porous concrete tile will be placed in the mass concrete near the upstream face of the dam. A system of pipes will be installed in the concrete of the dam, through which water will be circulated to remove the heat of set of the cement from the concrete artificially. A system of galleries will also be provided in the dam for inspection and for cooling and grouting operations.

Four reinforced concrete towers, consisting of an elevator, a hoist, a utility and a concession tower, will be constructed on the dame. The embankment section of the dam will consist of a moistened and rolled fill of clay, sand and gravel, a rolled rock fill portion, and rock fills of increasing thickness from crest to foundation on the upstream and downstream slopes. A vertical concrete core wall founded in rock will extend through the central portion of the earth fill. A foundation gallery will be constructed in the base of the core wall, and two inspection shafts will extend from the crest of the embankment to this gallery. Also a vertical concrete core wall with rolled fill adjacent to the wall will be constructed at the right end of the concrete portion of the dam.

Spillway Controls Flow

Flow over the spillway will be partially controlled by three 110 by 28 foot drum gates mounted on the crest between piers which will also serve as supports for a bridge connecting the roadways of the abutment sections. A long concrete apron will be constructed at the toe of the spillway section. Thirteen main 102-inch diameter outlet pipes, circular shaped, at the upstream end and constricted to a smaller section at the outlet end, will be embedded in the concrete of the spillway section. These outlets will be installed at three elevations about 100 feet apart, with three outlets at each of the lower elevations and seven at the highest elevation.

Five main unit power penstocks, each 15′ 3″ in diameter at the intake end, a 48-inch station service penstock and two 86-inch diameter needle-valve outlet pipes will be embedded in the concrete of the right abutment of the dam. Trashrack structures on the upstream face of the concrete portion of the dam will provide protection at the intakes of the outlet pipes and penstocks. The flow through the thirteen 102″ outlet pipes will be controlled by tandem installations of high-pressure hydraulically operated ring-seal gates, except the top tier which will be controlled by single gates. Discharge through the needle-valve outlet pipes will be regulated by 60″ diameter needle valves at the outlet ends and by high-pressure hydraulically operated ring-seal gates installed near the inlet ends to provide for emergency closure. Emergency closure for the station service penstock will be effected by a 48-inch diameter ring-seal gate installed near the west end.

Shasta dam will contain 5,600,000 cubic yards of concrete and will form a reservoir 35 miles in length with a drainage area of 6,665 square miles. The reservoir will have an area of 30,000 acres and a capacity of 4,500,000 acre feet. There will also be a hydroelectric plant at the dam with a power plant capacity of 375,000 kilowatts.

Relocation of Southern Pacific R.R.

Winding along through the Sacramento River canyon is the main line of the Southern Pacific Railroad. This railroad has to be relocated and taken out of the canyon, as its course runs the entire length of the reservoir and directly through the area to be excavated for the dam. To serve the dual purpose of river and railroad diversion and to minimize the interference with excavation at the damsite, an 1,800 foot railroad tunnel was cut under the west abutment of the dam. When the permanent 30-mile railroad relocation is completed around the Shasta reservoir this temporary by-pass tunnel will be used for river diversion during the pouring of concrete in the central por-

tion of the dam. This tunnel was a separate contract and was handled by the Colonial Construction Company.

In a large undertaking, such as the building of Shasta Dam, the care and housing of the workers is the first task to consider along with the length of time that will be required to complete the job. The camp area is located right at the dam site and is divided into three sections. The residential area, dormitories and office area, and the shop area.

The residence section of the camp is composed of 132 houses, varying from two to six rooms. The buildings were constructed with the same care as is required by the building code along the Pacific Coast, and all are equipped with electric stoves. Within the camp and dormitory area is a complete sewerage and electrical system. The occupants of the houses are mostly families of foremen and key men.

The dormitory area consists of one large double winged, two-story structure, capable of providing for 172 men and one 2-story, 96-room dormitory. These buildings have all single rooms and are air-cooled in the summer besides having their own individual heating systems. There is also an office and guest dormitory, which provides for 82 people. The occupants of this building are mostly composed of the single office men and foremen. The mess hall building provides dining room service for about 350 persons per meal and also contains the post office, grocery store, barber shop, poolroom and commissary.

The office building is a one-story structure, built on the side hill, well above the other buildings and provides an excellent view of the entire job.

Unusually Complete Hospital Set-Up

In any large construction work, such as is being carried on at Shasta Dam, it is necessary to consider medical and hospital service. This is not only necessary for the injured employee, but also for the ill employee. Large concerns have noted over a long period of time that a healthy employee is an efficient employee. As a first step at Shasta Dam, a thorough physical examination is given all employees before their employment, in order that physical defects may be noted and corrected.

The Pacific Constructors have erected a modern twenty-four bed hospital at Shasta Dam with the latest equipment for the care of their employees. A cooperative medical plan is in effect which allows the employee complete hospital and medical care for fifty cents a week, contributed to the mutual benefit plan. The patient whose injuries are attributable to his employment is, of course, taken care of at the Company's expense. The hospital and facilities have been approved by the Industrial Accident Commission of the State of California.

Any type of operation or treatment can be rendered at the hospital. It has been found that moving the patient long distances following his injury is detrimental to him and prolongs his disability. Hence, Shasta Dam Hospital is located very near the site of construction operations.

In the hospital there are the following rooms: four private rooms with bath; two 4-bed wards; one 12-bed ward; linen, bath, utility, and toilet rooms; hospital kitchen; business office; doctor's offices; nurses' dressings preparation room; clinical laboratory; X-ray and developing room; examining room; a large emergency room; operating room; splint room; physiotherapy room; and a sterilizing room with a battery of the latest type high pressure steam sterilizers.

Living quarters for the men nurses are on the lower floor, the hospital being built on the side of a hill. Also on this floor are the storerooms, drug room, boiler room, and a room for the air conditioning apparatus.

Complete Clinical Laboratory

The Clinical Laboratory is complete. Blood counts, blood chemistry, blood typing for transfusions, urinalyses, and all necessary bacteriological examinations are made. The water analysis of the camp water supply is done here.

All employees must pass a rigid physical examination by the chief surgeon of the Shasta Dam Hospital and a complete clinical record is kept of every patient treated at the hospital. This latter record makes for an efficient check up on accidents and furnishes the necessary information for the

(*Continued on page 702*)

● **The same view taken five months later, showing the rapid progress made in the excavation operations. Maintenance and residential buildings are at the right.**

AIR TOOL LUB

An informative discussion of the four characteristics of a good air tool lubricant

By C. J. COPLEY
Lubricating Consultant

ABOUT A YEAR ago we discussed in these pages (Excavating Engineer — October, 1938) the lubrication of air compressors. We told of the many duties the lubricating oil must perform, describing the difficulties of maintaining proper oil films in the compressor cylinders and bearings. We stressed the necessity of using lubricants that would resist carbonizing, and the forming of gums to stick piston rings. The need of exercising care in the feeding of minimum amounts of the lubricant were also pointed out.

Air Tool Efficient As Its Lubrication

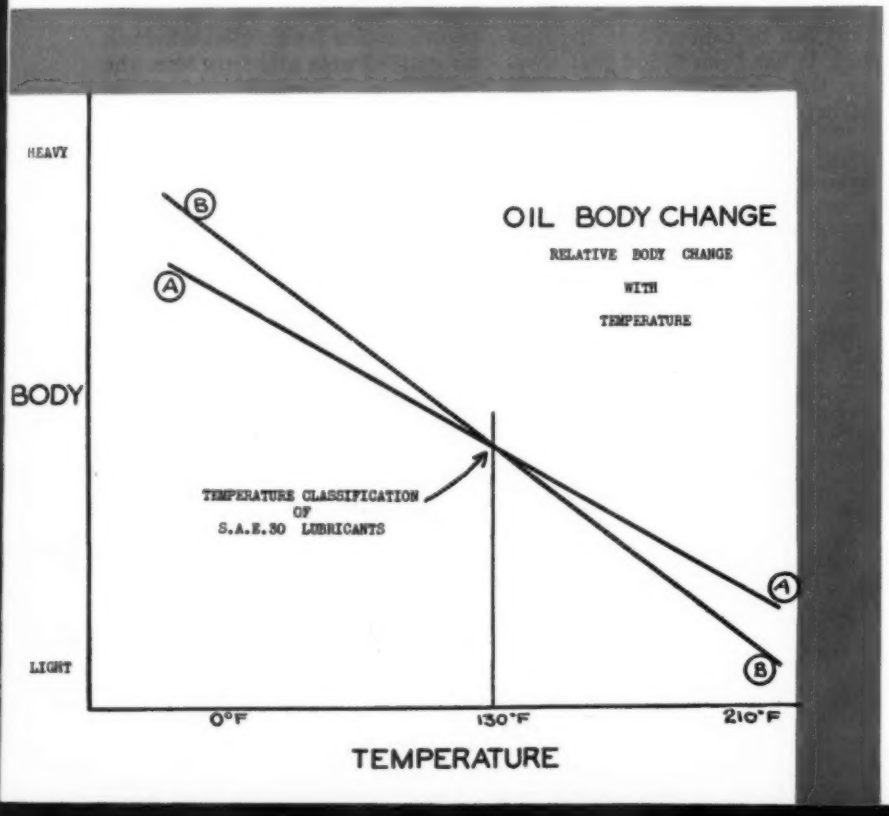
Yet, we left the story of compressed air only partly told. Getting the air economically and efficiently under pressure in the receiving tank is one problem. Using that air economically and efficiently through the many types of air tools is another problem. In both, lubrication plays an important part.

Air, under pressure in the receiving tank, is a potential source of power. It is a power which if properly and efficiently used through the proper tool, has and will save countless hours of back breaking toil that otherwise could only be accomplished by tedious hand labor. The air tool, in its many designs of drills and hammers has played, and is playing, an important part in our conception of modern construction efficiency. It must be remembered, however, the air tool, as well as the air compressor, is only as efficient as its lubrication. Efficient lubrication smooths the way to achieving efficient work results. Faulty lubrication can, and often does, turn the black ink of profits to the red ink of losses, when job costs are figured.

Actually the air tool is a simple device. It is not the purpose of this article, however, to either discuss or explain the mechanics of the air tool. Neither is it our intent to explain the various methods of lubricating air tools. The manufacturer has evolved tool design to a high degree. He has given pertinent consideration to lubrication. The application of the lubricant may be competently accomplished by "hand" or by many forms of "impulse" and "air line" oilers. The tool designer has recognized the demand for suitable lubrication and has so designed his equipment to provide simple and effective protection.

The tool designer however cannot provide a protection against the use of improper lubricants. The tool itself cannot be made fully "fool proof" for *any* oil. Perhaps "any oil" will work for a short time, but effectual tool operation means *freedom* from troubles—not a postponement of trouble.

In one sense, improper lubrication is not only always the fault of the operator. Most oil suppliers have made available for purchase, good air tool lubricants. These good lubricants, however, cost money. Oftentimes, in the absence of appropriate information or complete instructions from the tool manufacturer, the tool operator feels that "any oil" will be satisfactory. He may feel that the oil being used in his gasoline or diesel engine—a high grade lubricant, let us say—is satisfactory for air tool lubrication. In cases of this sort we feel that many times the tool manufacturer has avoided the responsibility of giving the purchaser proper information about the lubricant that should be used. Certainly, if the tool manufacturer says in his instruction book, "Use a good grade SAE 10 oil," then the responsibility for faulty lubrication is the manufacturer's and not that of



● Showing how the body of two oils, both SAE-30, may vary at high and low temperatures. While oil "B" is heavier then oil "A" at 0°F., oil "A" maintains its body with temperature rise, thereby affording better protection at 210°F.

RICATION

the operator who has been guided by such meager and misleading information.

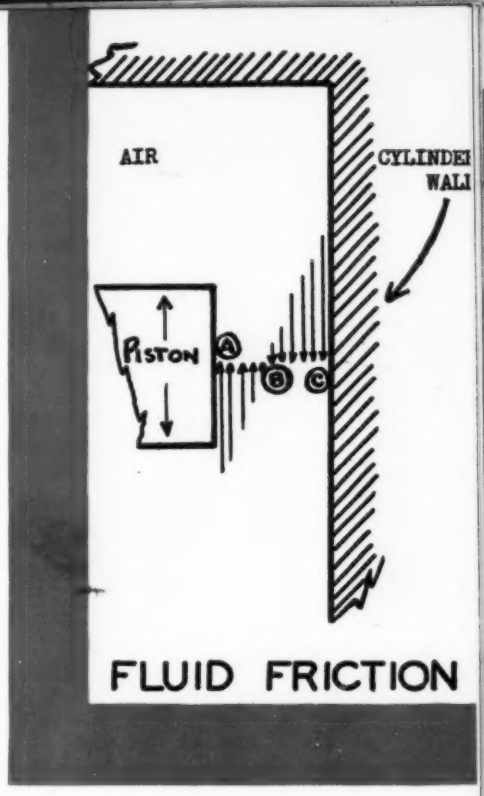
What type of lubricant should be used in the air tool? Should it be made from a Napthenic Base Crude Oil? Paraffinic? Should it have a low pour point? Have extreme pressure characteristics? Twenty cents per gallon? A dollar a gallon? Yellow? Green? Let's look at the problem and consider the characteristics the oil should enjoy to be a good air tool lubricant.

Judging a Lubricant

Regardless of the color of the oil, the nature of the crude oil from which it has been refined or the price per gallon that we pay for it, the oil must have the ability to do a good job of lubrication. The terse statement, "Do a good job of lubrication" is in itself a simple definition of our lubricant. It implies, however, a multitude of factors relating to the conditions of air tool operation that must be considered when we select this lubricant. In meeting these conditions of operation, namely, to minimize the waste of compressed air needed for tool operation and to minimize the cost of tool parts maintenance and replacement, four definite characteristics must be looked for and found in the chosen lubricant.

Proper body is the first of these essential characteristics. The body of a lubricant is measured by its rate of flow or ease of displacement. It is a simple matter to determine relative bodies of lubricants at similar temperatures. We may note the rate of flow of two lubricants by judging their rate of flow from two containers. We can easily tell which is the heaviest or which has the thicker body. What we are not able to do, without suitable laboratory equipment, is to determine their relative bodies at the temperature at which they will be called upon to perform their duty of protection. In air tool operation this working temperature might run from 0° to 225° F, or beyond, depending upon the quality and quantity of the oil between moving parts. Two oils may have the same body at room temperature but at 225°F they may be entirely dissimilar.

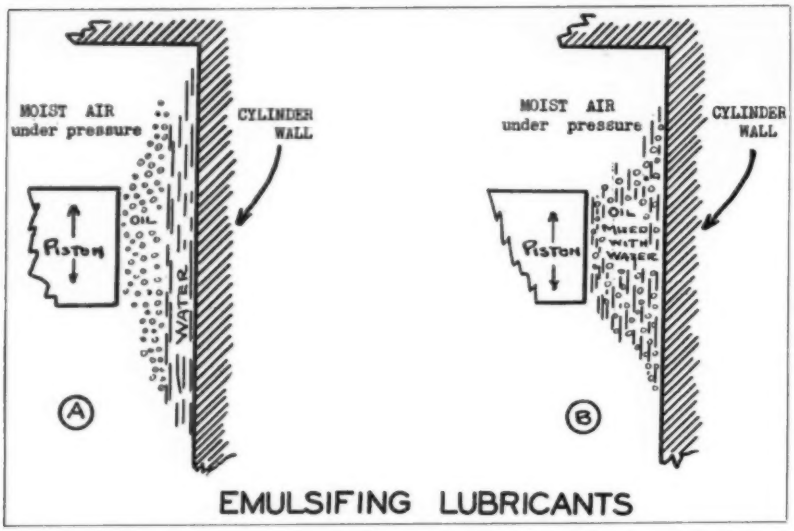
This measure of oil body is commercially scaled by its viscosity, or, in other words by its rate of flow in seconds at a given temperature through a given size orifice. Its viscosity, then, becomes important because it is directly related to the loss of power in our air tool. This relationship of viscosity to power loss exists because the lubricant must have sufficient body, or high viscosity, to permit it to act as a seal between the air tool piston and its cylinder wall. If this sealing film is weak because the oil is too thin, the air under pressure atop the piston, expending its power by pushing the piston against the drill or hammer mechanism, will leak past the piston and waste of power is experienced. On the other hand, if the oil is too thick or has too high a viscosity than we need for proper sealing, we will experience power loss because of the development of successive "fluid friction" in the oil itself. This development of fluid friction is little understood in theory. We have around us all sorts of common illustrations, particularly in cold weather when oil bodies are increased to a marked degree. We all have experienced the difficulty of starting our automobile on a cold winter morning. Engines are reluctantly turned over by the starter and many times will not revolve at all. This phenomena is a result of low temperature building up an excessive body in the engine oil, which, technically, is a condition of excessive fluid friction. This same situation exists in the air tool when oil body is too high. The oil refuses to be displaced from the cylinder wall by the stroke of the piston. The heavy oil film refuses to be sheared by rotating bearing shafts. Hence, power is lost and air pressure is wasted through the expenditure of part of its force in overcoming fluid friction of the oil rather than on effective actuation of the tool mechanism.



● Efficient lubrication means the maintenance of an oil film between cylinder wall and piston. Some of the oil will adhere to, and move with, the piston as at "A," while the oil coating the cylinder wall at "C" remains stationary. The power needed to shear this film as at "B," is power lost because of fluid friction. The thicker the oil the greater this loss of power.

Thus the body of the oil, or its viscosity, is important. The correct bodied lubricant must be selected. Yet most tool manufacturers merely say in their instructions "Use an SAE 10 oil" or SAE 20 oil as the case may be. When it is realized that SAE numbers merely establish a maximum and minimum body at *one* temperature, i.e. 130°F for lighter lubricants, and are irrelevant to the body of the oil at tool operating temperatures where the oil will do its job, it is appreciated that SAE numbers are but a poor guide to the selection of a suitable lubricant for efficient tool operation.

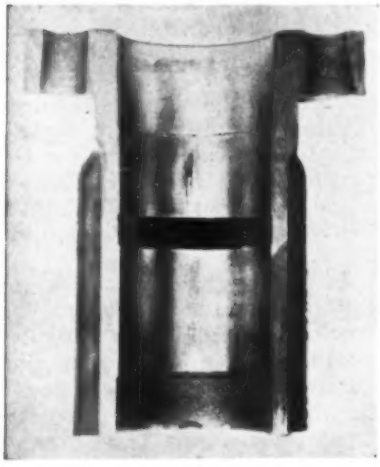
In setting up recommendations for the proper body of an air tool lubricant, a minimum viscosity should be given for the high temperature range and a maximum limiting viscosity for the low temperature range. Thus, for nor-



● Comparison diagram showing the advantage of lubricants that mix readily with water. Sketch "A" shows how straight mineral oils are floated away from the cylinder wall, eliminating the lubricating film and resulting in piston wear. Sketch "B" shows how a properly compounded air tool lubricant will mix with moisture, always providing a lubricating oil film which will minimize piston wear.

mal air tool lubrication, we should look for an oil that enjoys a viscosity of not less than 65 seconds at 210°F and at the same time have a viscosity of not more than 8000 seconds at 32°F.

Incidentally, the "pour point" of a lubricant should carry but little weight in the consideration of our lubricant. We appreciate that many an excellent sales presentation for air tool lubricants is based on this matter of "pour point" readings. If the purchaser was certain that the "pour point" temperature was not a ficticious reading, we then might be somewhat influenced by such a specification. It so happens that the additions of compounds known as "pour point depressents" will make this particular specification not all that it appears to be. The addition of such pour point depressent agents to a lubricant will undoubtedly lower the "pour point," but we are interested in a given lubricant's rate of flow and not its displacement by gravity. Pour point depressents merely make oil displacement easier at low temperature, but have little to do with decreasing viscosity. Proper body or proper viscosity at *both* low and high temperatures is the major consideration in our selection of a suitable air tool lubricant.



● A cross section of a drill cylinder scored by lack of oil. These fine lines swell into cracks and lead to premature breakage. (Photo courtesy Ingersoll-Rand.)

Proper Compounding of Ingredients

Second important characteristic in a good lubricant is the proper compounding of its ingredients. In all air tool operation, moisture is a factor that must be considered in selecting a good air tool lubricant. While the amount of moisture getting into the compressor system will vary depending upon the care taken and the equipment used to prevent its formation or its entrainment, the lubricant must be capable of satisfactorily resisting the effect of water contamination.

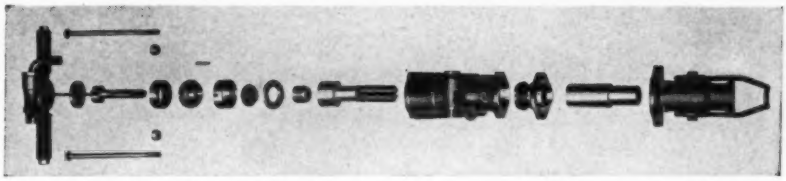
Where water is used for the removal of cuttings from rock drills, it is practically impossible to keep the lubricant free from water contamination. In the operation of air hammers, etc., the degree of contamination with water, while materially less, nevertheless exists and must be considered. Moisture will be condensed in the air lines and will be precipitated as the hot compressed air comes in contact with the cooler surfaces of the tool mechanisms. Hence, we are forced to select an oil that will resist the effect of this moisture, regardless of tool service.

Water, because it is heavier than the lubricant, will float oil upon its surface. The fundamental requirement of lubricant in serving to protect moving parts against wear is to coat these moving parts with tenacious oil films of suitable thickness so that these moving surfaces will be separated and not allowed to be in contact. They must be separated to prevent their scuffing and eventual seizure.

Should we coat these moving surfaces with a straight mineral oil, water, reaching the mechanism, will get under the protective oil film and "float" our lubricant away from the pressure areas. Oil films provided by straight mineral oils under such conditions of water contamination just will not exist, resulting in excessive wear and ultimate tool failure.

Thus it becomes necessary to so treat the lubricant for air tools that it will be able to resist the washing action of water. This desired reaction to water is accomplished by adding a small percentage of a suitable compound to the straight mineral oil that will enable it to *mix* with water. The compound used is usually an animal or a vegetable oil and is added in varying amounts from 3% to 11% depending upon the degree and permanence of the emulsion desired. These animal or vegetable oils are known as "emulsifying" agents and when mixed into a straight mineral oil enable the resultant mixture to *absorb* moisture and not be repelled by it.

This practice of so treating straight mineral oils is employed,



● The many small parts of the modern high speed jackhammer need the constant protection of efficient lubrication. (Photo courtesy of Ingersoll-Rand.)

not only in the manufacture of air tool lubricants, but also, and more widely in the making of steam cylinder lubricants. In this latter service water in the form of steam would wash a straight mineral oil away from the engine cylinder walls and allow piston rings to rapidly score and soon damage the finely finished surfaces of the engine.

What type and in what amounts these emulsifying agents should be used in our air tool lubricant is a subject in itself. It should suffice to know that their presence is not only advisable, but as a matter of fact, their presence is essential.

Again we point out that the tool manufacturer who recommends, and the tool operator who specifies, a lubricant merely by SAE numbers does not in any way indicate that the oil be suitably compounded. SAE numbers do not differentiate between straight mineral oils or compounded oils. An SAE 20 oil may be of either type—one of which if used will cause trouble with both pocketbook and job accomplishment.

Chemical Stability Important

Chemical stability is the third qualification of a good lubricant. The oil used in air tools is subjected to as unfavorable a set of conditions as it is possible to develop in a given job of lubrication. Here we have the undesirable contact of the oil with water. We have high temperatures developed in the air tool because of the necessities in design that must allow for the cushioning re-compression of air to avoid "hammering" at the end of the piston stroke. This re-compression temperature, under conditions of continuous operation, will run high enough in many cases to detrimentally affect the oil, not only by physically reducing oil body to a point where protective oil films are dangerously weakened, but high enough to affect the chemical make up of the oil itself.

Dust is bound to be entrained in the air lines unless strict precautions are taken for its elimination through the employing of efficient air strainers at the compressor intake. Dust entrained in the air line will adhere to the lubricant coating the moving parts, and, under the high temperatures, bake into a tacky, carbonaceous mass that restricts valve action and freezes pistons. Oftentimes the lubricating oil is blamed for this gummy mass. The oil is said to have "broken down" or to have "carbonized" whereas even the best of lubricants would have difficulty repelling the attack of dust in the air supply. As a matter of fact, it is not uncommon to even find pieces of rubber hosing and valve packings mixed in the lubricating oil—a condition hardly to be blamed on the lubricant for its failure to protect the air tool against wear and failure.

Heat, air, agitation and contamination are the four worst enemies of a lubricant. In an air tool lubrication we have all four, and several cousins thrown in, for good measure. Hence, the oil we select for this service must be properly and carefully refined from the best and most suitable crude oil to permit it to enjoy the maximum of both chemical and physical stability in order to combat the punishment it must take in air tool service.

It is unfortunate that no number or rating has as yet been formulated that will indicate this characteristic of chemical stability in a lubricant. This characteristic of stability is one that does not lend itself to regimentation. True, certain carbon residue tests, emulsion tests, etc., have been devised, but these, by themselves, are worthless. It is one matter to test an oil for chemical stability in a laboratory test-tube but it is a horse of a different color when that oil gets into an air tool under actual working conditions. The results obtained in laboratory tests cannot be indicative nor accurately correlated with the many variables of actual service.

The recognition and selection of an oil for air tool lubrication meeting the requirement of chemical stability can only rest with the purchaser. The purchaser must depend upon the reputation and the ability of the oil refiner to build into his air tool lubricant the faculty to resist chemical change.

(Continued on page 710)

● Careful daily lubrication of drills before they are put to work will lengthen their period of usefulness and add much to the efficiency of their performance. (Photos courtesy The Cleveland Rock Drill Co.)

Restoration of the flood-wrecked Mohawk Trail was a difficult rehabilitation job accomplished in a comparatively short time by the men and machines of C. J. Maney Company

By SPENCER JONES

NEW ENGLANDERS will long remember the afternoon and evening of September 21, 1938, the date of the hurricane and floods which left a trail of unprecedented havoc and horror in their wake. In four short hours thousands were left homeless. Property damage amounted to many millions of dollars and the number of those killed and injured ran high.

Communities were completely isolated. Public utilities, railroads, telephones and highways were paralyzed and damaged to an almost unbelievable extent. Characteristic New England fortitude made it possible to start the work of rehabilitation immediately . . . and this is the story of some of that work.

The famous Mohawk Trail, which follows the old Indian footpath through the Berkshires in Massachusetts from the Connecticut River up the Deerfield River valley and the Cold River Valley, over the divide and down the Hoosac River valley to the Hudson River, was found to be practically gouged out of existence in several places.

West of Charlemont, Massachusetts, the Mohawk Trail leaves the Deerfield River valley, crossing the Deerfield River at its junction with Cold River and following the Cold River valley halfway up to the divide at Whitcomb's Summit. It was in Cold River valley that the Mohawk Trail suffered the most serious damage.

The valley bottom is barely wide enough to hold both road and riverbed. In some places the channel had been narrowed to provide fill space to carry the highway. Although for many years the Cold River had made no protest about the maner in which the Mohawk Trail had usurped some of its narrow, curving channel, the flood . . . preceded by four days of incessant rain . . . changed what had been hardly more than a babbling brook into a raging monster, intent on devouring the interloping road.

After the waters subsided there were many places in Cold River valley where it was difficult to distinguish the roadbed from the riverbed. The river had driven out the usurper, but not for long.

Tackling a Tough Job

Shortly after the flood, the Commonwealth of Massachusetts, having surveyed the appalling extent of the damage, called on C. J. Maney Co., Inc., of Somerville, Massachusetts, the low bidder, to rehabilitate the remnants of what

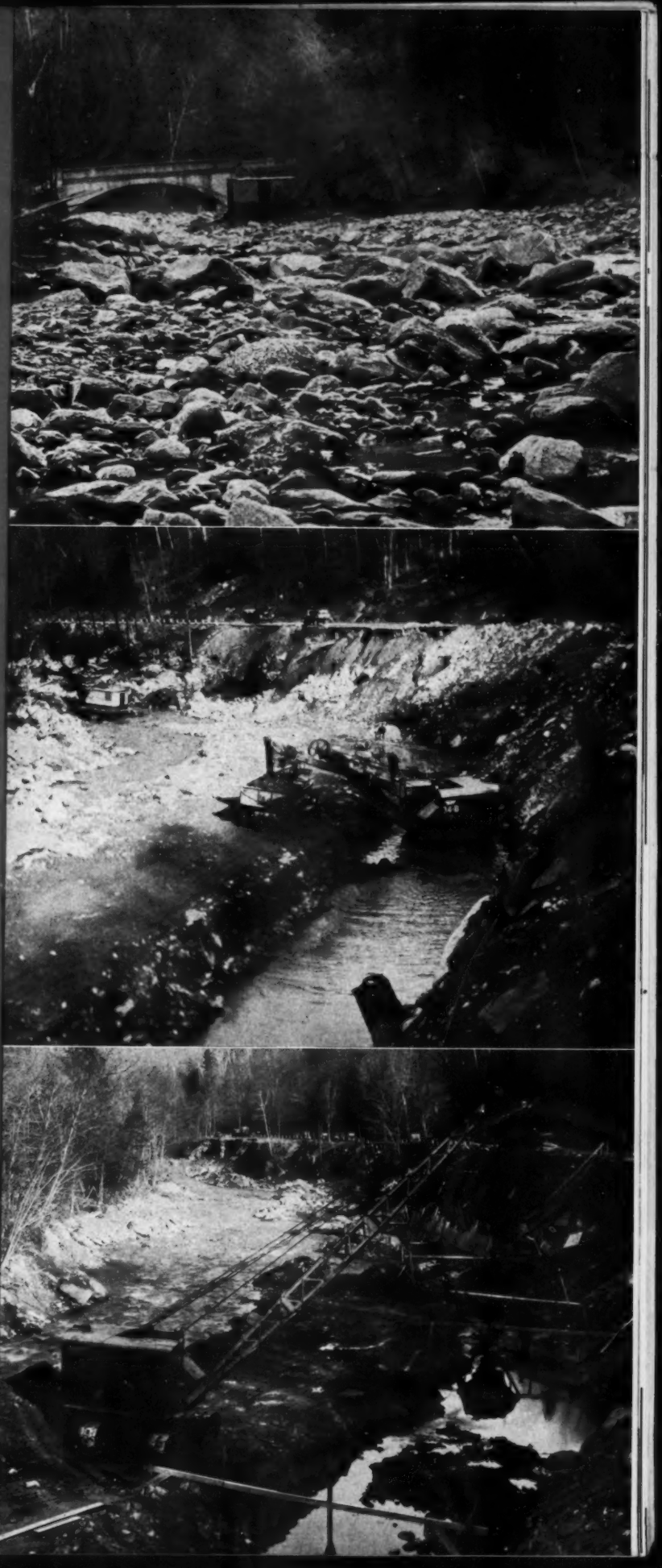
was once a road, but had become a maze of huge boulders, uprooted trees and all manner of debris.

No one could possibly realize the hardships encountered by men and machines in rebuilding the Mohawk Trail and rechannelling the river unless they had actually seen the ruins of this road through Cold River valley. Rigidly confined between steep mountainsides, the four-mile strip of ruin was utterly inaccessible except at the ends. From Mohawk Park, a State camp site, through uninhabited parts of the townships of Savoy and Florida to "Dead Man's Curve," the contractor, his men and machines were confronted with conditions which called forth the full measure of their experience and capabilities. The results were a triumph of organization and equipment which no one not thoroughly familiar with the circumstances could appreciate.

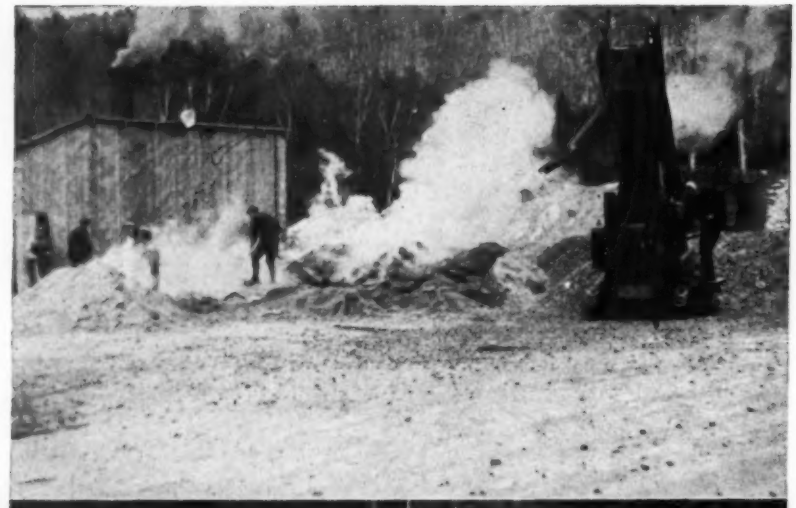
The foregoing is a mild description of the picture which presented itself to the staff of C. J. Maney Co., Inc., when they moved into Charlemont, Massachusetts, in October, 1938; set up their field office, shops, garages and other structures; and "dug in" for a tough job.

The job, itself, was certainly tough enough without the additional handicap of having to start operations in late autumn. The trees were already shedding their multi-colored leaves and the cold frosty mornings warned that winter was coming to the Berkshires, where winter is noted for its bitter cold and great length.

In brief, the job consisted of the clearing, deepening, and in some places the widening of the river channel; the building of more than 5,000 feet of heavy and high concrete retaining walls to protect the roadbed from possible future floods; the replacement of all washed out highway fill and the raising and widening of the roadbed in several spots; the lay-



● **Top: A boulder-strewn river bed offers some tough going for the shovel during channel clearing operations. Center: Water surges around the "cats" of these Bucyrus-Erie shovels as they dig footings for the concrete retaining walls. Bottom: A Bucyrus-Erie clamshell cleans up a dirt slide in the footing ditch.**



● Top: Heating sand and gravel at the batch plant. A Barber-Greene loader is in the foreground. Center: With water boiling around her "cats" this Bucyrus-Erie 33-B loads river bed rock to a Koehring Dumptor. Bottom: View of the wash-out of the Davis Mine Brook bridge.

ing of reinforced concrete, cast iron and perforated bituminous coated corrugated metal drainage pipe; the placing and cementing of large quantities of rip-rap above the concrete retaining walls in many locations, and the construction of rock embankment where no retaining wall was built; and, finally, the surfacing of the road, the fine grading, the fence work and other miscellaneous items. First a new riverbed . . . then a new road!

Cleaning Out the Channel

The clearing of the channel was enough to give any contractor the jitters. Huge boulders, mixed with all kinds of debris had to be moved either as a whole or after being blasted into smaller fragments. The work had to be done in the riverbed and could not be handled from the bank, because there wasn't any bank in most places and because if there was one the channel was too wide to work across.

A fleet of power shovels crawled up the boulder-strewn river bottom to start channel excavation at many different points. The progress of these shovels on their difficult trip to the scene of operations was an accomplishment in itself. Six Bucyrus-Erie shovels, (a 1¾-yard 43-B, a 1¼-yard 34-B, a 1-yard 32-B, a 1½-yard 37-B, and two 1¼-yard 33-B Bucyrus-Erie shovels) a 77-D Thew-Lorain shovel, and a Koehring 301 clamshell comprised the rather imposing Cold River fleet which was used to clear the channel as quickly as possible to minimize the danger of recurring floods.

For hauling, another fleet was used . . . eighteen Autocar and Sterling dump trucks with seven-yard bodies, and seven Koehring Dumptors. Storage piles along the river took care of excavated material not immediately needed for highway fill, but there was seldom less than a half mile haul in each direction to storage pile or fill.

Equipment Meets Tough Going

Trucks and shovels were called upon to meet the excessive strain of lifting and hauling huge loads along a cruelly uneven river bed

throughout a stormy and cold New England winter. Most of the time water flowed above the tops of the shovel "cats" and above the hub caps of the trucks. Then, as the weather got colder, ice started to form. In fact, there was hardly a thaw all winter long, and the ground froze to a depth of four and five feet; remaining frozen until late in the spring.

Despite such constant hindrances to efficiency, the shovels and trucks kept slugging away and it was soon possible to start trench excavation for the concrete retaining walls. Working among heavy boulders this trench excavation was done mostly by the 34-B and one of the 33-B Bucyrus-Erie shovels, aided by a Koehring 301, rigged with a boom and clamshell bucket. The same kind of grief was encountered in digging the trenches as in clearing the river channel, but by this time the men were considering that boulders less than two feet in diameter were nothing but pebbles, so it wasn't long before a small army of carpenters was working in ice and snow on the wooden form work for the concrete retaining walls.

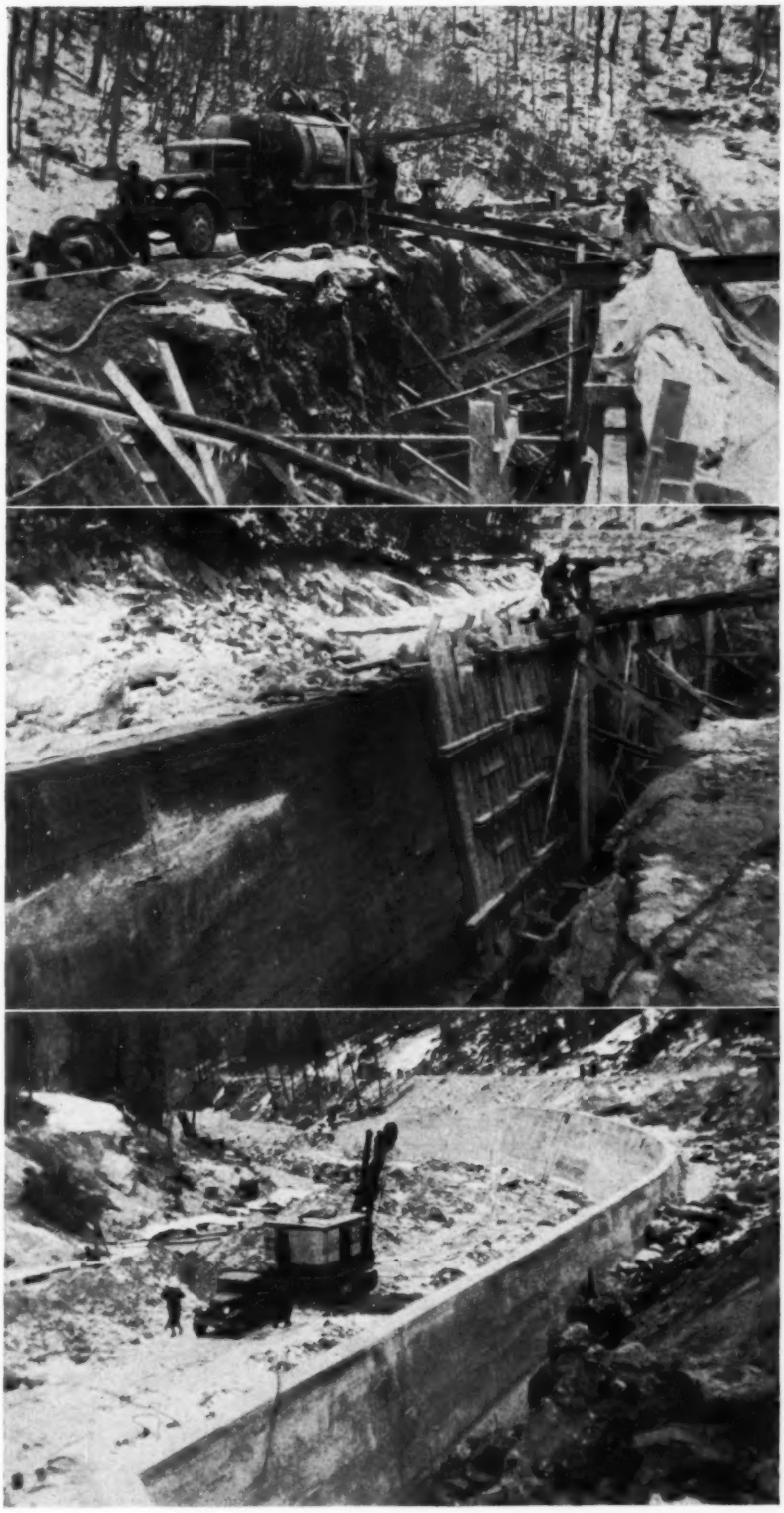
Water was a constant problem on the job, and particularly in the building of the retaining walls. Channel excavation was carried on in a manner designed to keep the river flowing on the opposite side of the riverbed from the walls. This method was wise and necessary, for otherwise the periodic and sudden rises of the river would have made the building of the retaining walls practically impossible. Despite the use of stream diversion, water still seeped or overflowed into the footing trenches in large quantities, so three 6 inch pumps, two 4 inch pumps and two 3 inch pumps were kept busy constantly, and the usual sandbag coffer dams were constructed.

Working in Snow and Ice

Ice was continually forming in the footing trenches and on the concrete formwork, as well as accompanying heavy snow on the hauling road and in the riverbed. The difficulty of continuing the operations at persistently sub-

(*Continued on page 712*)

● **Top: Erection of concrete retaining walls was an important feature of the restoration. Here ready-mixed concrete is poured from a Whittemore plant. Center: Completing another section of the retaining wall. Bottom: The completed wall which will hold future flood-swollen streams in check.**



EXCAVATING ENGINEER

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Devoted to the Excavating Industry

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Recognizing Obsolescence

By Ralph H. Butz

Obsolescence is a more important factor in depreciation than wear and tear in modern industry. Whenever a piece of machinery or other asset is less profitable than a new and improved one would be, it is obsolete regardless of its age or the amount of wear it has experienced. There is always greater economy in scrapping obsolete equipment than in wearing it out.

Depreciation is a production cost paid in advance. It is as real an overhead cost as labor, rent and power. It differs from other overhead items only in that it is a fully prepaid operating expense.

One of the principal difficulties with the question of depreciation reserves is that it is a problem that has been left almost entirely in the hands of the accounting department or of a bookkeeper instead of being considered as a management problem needing the attention of executives so that wise policies may be developed.

It is unwise to overlook the constant rise in standards of perfection of products and services which place greater demands upon plant and equipment. Today, with competition keen, the margin between success and failure is narrow and there should be no handicap by lack of knowledge of true costs and consequent inability to replace equipment which is obsolete or inefficient.

It would be impossible to attempt to prescribe in detail a system of calculating depreciation reserves for a number of contractors operating under widely different conditions. Standard rates are not practicable.

There are, however, several fundamental principles upon which all sound depreciation reserve policies are based. These policies are important. They should be tested, studied and applied.

Since investment of capital in an asset is in reality prepaid depreciation expense, the principal purposes of establishing depreciation reserves through current charges to income are: To maintain capital investment intact, and to recover the cost of the asset from the selling price of the product of the asset during the useful life of the asset.

The prediction of the probable life and productiveness of an asset is essentially a management problem requiring in each individual case consideration of: Wear because of use; obsolescence of asset; obsolescence of product; the rate and method of recovery of the cost of the asset.

Depreciation reserves accumulated from the selling price of a product of an asset should be subjected to the same budgetary control and accounting record as other elements of production cost.

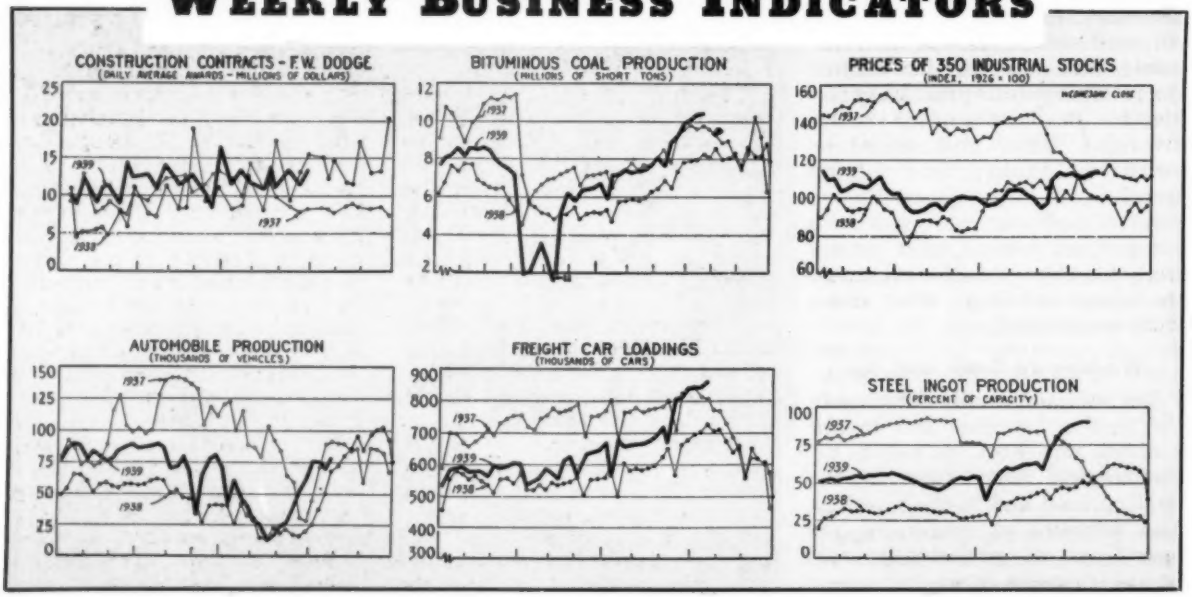
Adequate records are necessary to determine an accurate depreciation rate for each asset. Not only are records essential to prove justification of a depreciation rate for the Bureau of Internal Revenue, but they are necessary to management in determining accurate and sound policies.

Depreciation reserves should be available when required for replacements. Depreciation charged to cost and recovered in sales should in theory be set aside in a separate cash account or invested in liquid securities. However, management policies may make it desirable to employ depreciation funds in the business itself for repaying bank loans or increasing working capital.

When such use of depreciation funds is made it should be borne in mind that they have been borrowed from capital and should be restored. Depreciation reserves should be as carefully budgeted as other elements of production costs.

Management should know at all

WEEKLY BUSINESS INDICATORS



times whether reserves for depreciation are: Set aside in an investment fund or securities; being used to acquire additional equipment; borrowed from working capital to avoid bank loans; lost in some other account and actually eating up capital.

Depreciation rates must be adapted to individual contractors and individual assets. While nationally standard rates of depreciation or methods of accumulating them are not always practical, it is probable that common standards may be applied to like corporations or like assets where operating and competitive conditions are similar.

Keeping the tax bill down is not the primary purpose of studying depreciation. That is secondary because it is inconsequential in comparison with what can be accomplished in more profitable operation as the result of studied application of sound policies.

War and Prices

The people of the United States are united in the determination to keep this country out of war. That we can do, if we keep our heads cool and do not allow our emotions to run away with our convictions.

We *can* avoid war—but we *cannot* hope to avoid altogether the effects of war.

Trade is disturbed. Risks are multiplied. Industries are subjected to abnormal demands. Materials and supplies which ordinarily are used to meet peacetime needs are diverted to destructive ends.

These effects are not limited to the countries actually at war. Although we are separated by a wide ocean from the area of conflict, they are felt in every town and city of the United States and even on the farms which produce the supplies that go to sustain the fighting populations. In this respect we cannot wholly isolate ourselves.

In a situation such as this, therefore, it is of the utmost importance that we *keep our balance,* that we do not permit hysteria to get the better of our common sense, that we do not indulge in a scramble for temporary gain which will end in permanent loss.

This applies to every one of us —buyers as well as sellers, consumers as well as producers.

Certain price adjustments are inevitable because, in a time of war, some costs are bound to increase. This is especially true of imported commodities. The hazards and losses of overseas transportation are only too apparent.

"Don't you think Snodgrass is takin' this war scare too serious?"

Depressed industries—such as agriculture—are also justified in bringing their operations up to a reasonable profit level.

But runaway prices cannot be condoned from any point of view. Profiteering leads to its own downfall. The last state of the business that engages in it is worse than the first.

We quote here from a statement made by W. Gibson Carey, Jr., president of the Chamber of Commerce of the United States:

"Certain increase may be necessary and desirable, but the process should be moderate. Furthermore price changes upward should be made only to obtain fair profits. * * * I can say flatly that business management in the United States is against profiteering at any time. The actual fact is that profiteering, in the long run, brings a reaction which more than offsets any advantages which have been gained."

No fixed rule for price regulation, which will bear equitably on all types and units of trade and industry in all places, can be laid down. This being true, it is of supreme importance that each of us, in our own sphere of activity, exercise prudent restraint and not allow ourselves to be stampeded by the tremors of a far-off conflict. The best assurance of peace is to stick to the ways of peace. The wise course, under circumstances which we cannot control, is to follow as closely as we can the policy of *"business as usual."*

Eastern States Show 30% Construction Rise

The dollar volume of total construction contracts awarded in the 37 Eastern States during the first seven months of 1939 amounted to $1,999,247,000, which is 30 per cent ahead of the same period last year according to statistics compiled by the F. W. Dodge Corp.

Non-residential building, with a valuation of $88,501,000, for July, 1939 has shown a 22 per cent increase over July of last year which is better than the 19 per cent increase that existed at the end of the first half. Included in this non-residential figure for July is $17,404,000 for manufacturing buildings, which is 10 per cent ahead of June this year and 80 per cent above July of 1938.

The residential contracts awarded for July, while $2,566,000 or 2 per cent below June, are 25 per cent ahead of July last year. Considering just one-and-two family houses, however, July equalled June of this year.

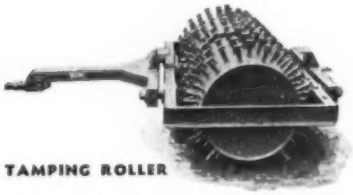
Equipment

you ought to KNOW ABOUT

B-E Introduces Rippers and Tamping Rollers

Rippers and tamping rollers are new tractor equipment items recently placed on the market by Bucyrus-Erie Company, South Milwaukee, Wisconsin.

The new Bucyrus-Erie Tamping Rollers are offered in single, double, or triple drum models, with



TAMPING ROLLER

72, 96, or 112 feet per drum available in each model. All rollers have rear pull connections for working in trains, and all drums are provided with openings for ballast. Double and triple drum models have oscillating drums which permit the rollers to adapt themselves to uneven ground surfaces. The tamping feet are renewable; when they become worn, they are not replaced or refaced by welding. Instead, they are easily removed and easily replaced with new feet at a fraction of the cost of welding.

The new rippers are of two types, the rotary type and the heavy duty cable-operated type.

ROTARY RIPPER

Outstanding feature of the rotary type ripper is a rotating head, which swings the ripping standards up and back and around to ripping position again quickly. This quick raising and lowering of standards makes the Bucyrus-Erie Rotary Ripper especially effective for work in material containing boulders and heavy roots. Complete rotation of the head also dislodges rocks and debris caught between the standards and prevents the ripper from picking up the same debris again. Since power to rotate the head is derived solely from the pull of the tractor drawbar, the rotary ripper can be used with tractors having hydraulic controls or with tractors having no auxiliary power equipment.

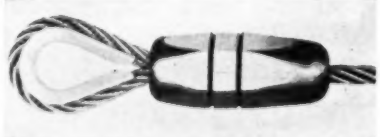
HEAVY DUTY RIPPER

The cable-operated ripper is a heavy duty ripping tool for breaking up exceptionally hard-digging hard-loading materials such as shale, hardpan, decomposed granite, sandstone, old macadam, etc. Controlled by a cable operated from the tractor winch, the standards on this ripper can penetrate full length below ground level, 17 inches on Model CR-1 and 24 inches on Model CR-2. The standards can also be set at any intermediate point or raised above ground for traveling. To add to the life of the ripper, the self-sharpening ripping points are renewable and can be easily replaced as they become worn.

Many other features of these new rippers and tamping rollers are described in bulletins published by the manufacturer. These bulletins can be obtained by writing to this magazine or to Bucyrus-Erie Company, South Milwaukee, Wisconsin.

"Safe-Line" Wire Rope Clamp

The "Safe-Line" wire rope clamp, manufactured and marketed by the National Production Company of Detroit, Michigan, offers some handy advantages according to a recent announcement by the manufacturer.



This convenient clamp has an inner surface that grips the wire rope, is double spiral splined to fit each strand and wire of the rope, thus making a perfect and secure grip on each section of each wire and strand. The gripping halves of the clamp are held tightly to the rope by taper threaded nuts. The "Safe-Line" clamp is made of high tensile strength steel and is guaranteed to outpull any wire rope made, according to the manufacturer. Stock sizes are for ropes $\frac{1}{8}$ inch to $\frac{3}{4}$ inch.

The clamp leaves no sharp wire ends nor projections to injure men who work with it. Unlike a spliced joint or zinced-in socket, a joint made with a "Safe-Line" clamp can be quickly readjusted to the proper tension without additional expense, and it can be used over and over again.

New Model "Load Lugger"

An improved Model "CH" of the Brooks Load Lugger is now in production by the Brooks Equipment and Manufacturing Company of Knoxville, Tennessee. This is an entirely new design, which represents the latest development in detachable bucket equipment for truck hauling. Advance notices say it is easily mounted on any standard chassis, and it offers important advanced features that result in faster action, easier control and higher truck efficiency.

Correct load distribution, well forward of the rear axle, elim-

inates excessive strains on the chassis and enables a 1½-ton truck to carry a fully loaded 2 cubic yard bucket. A unique jack-leg device, attached to the rear end of the Load Lugger frame, relieves the truck chassis of the overhanging load when the bucket is being raised, and makes counterweights unnecessary. This jack-leg adjusts itself to ground level, and is operated from the driver's seat.

The hoisting mechanism is operated by a simple power take-off from the truck engine. The hydraulic hoist is a heavy-duty double-type unit which raises or

"The fastest, most economical machine we have ever owned," Says J. L. Crittenden, Supt., Domingos Construction Co.
Mr. Crittenden has had this ¾ yard 10-B dragline stripping and loading bentonite clay since February 1936, so he can speak with authority. This 10-B is diesel powered and is running on an average fuel cost of 35 cents per 8-hour day — (five gallons of 7-cent fuel oil) — just 4-⅜ cents per hour! Another thing Mr. Crittenden likes is the ease with which the 10-B handles and moves around to do the 'handyman' jobs in the quickest, easiest way. Let us show you how this fast modern machine can be applied on your excavating to increase your profits!
Weighs 8½ to 9 tons; Travels 4¼ miles per hour; Steers like a tractor; Power 38 to 56 H.P.; Swings 5 r.p.m.; Hooked Conical Rollers (no center pintle); Twin, positive rope crowd; 28 Ball and Roller Bearings; Automatic Lubrication.
AT-46
Bucyrus-Erie
BUCYRUS ERIE
SOUTH MILWAUKEE WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

lowers both bucketbooms at once. Less than 20 seconds is required for raising, dumping or lowering the load. The oil pump and control valve are fully enclosed, in a compact unit and mounted under the deck plate, permanently protected.

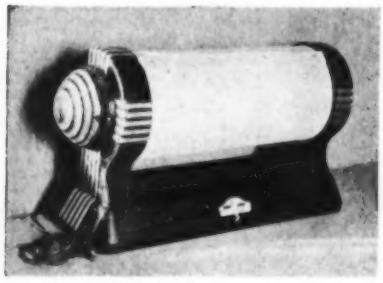
Simplified control is a feature of the new Load Lugger. The driver handles all operations from the cab, using one lever for controlling the oil valve of the hydraulic hoist and for engaging the dumping hook in discharging the bucket. The bucket is tripped by the dumping hook as it is lowered over the end plate, thus giving higher discharge and quicker spotting of the load. When desired, the loaded bucket can be set back on the ground without dumping.

The Load Lugger buckets are one-piece units, made of heavy steel plate, electrically welded and reinforced. They will hold any material without leakage, including sand or even liquids. They have a capacity of two cubic yards, struck measure, and a height of only 27 inches for easy loading. In carrying position, the bucket rests on the Load Lugger deck between two side plates, being held in place with a pair of double chains, so that it is impossible for the load to shift in any direction, even on the steepest grades that the truck can negotiate. An important advantage of the Model "CH" Load Lugger is the clear platform space provided by the deck plate. This can be used for hauling miscellaneous materials when the buckets are not in use.

According to the manufacturer, the new Model "CH" Load Lugger, operating with five to ten buckets, will replace an equivalent number of trucks and will show large economies in time, labor and equipment maintenance on all types of material hauling jobs where hand loading is employed.

"Minute Man" Blue Print Machine

Designed to be of practical use in the small office as well as the large engineering department, the Paramount "Minute Man" machine makes perfect blueprints in one minute or less. Occupying a desk space of 26 inches by 9 inches it makes prints in any size up to 18 inches by 24 inches. The original and sensitized paper are wrapped around an 8 inch diameter, 19 inches long crystal clear glass cylinder and held in place by a heavy canvas pre-shrunk adjustable cover. Two photo-flood bulbs inside the cylinder are controlled by a "Mark Time" timer which assures proper length of exposure for best printing. The low first cost as well as its low operating and maintenance cost and the simplicity of its operation make it an effective piece of equipment for any size department. The machine is manufactured and marketed by Paramount Engineering Company, 5707 West Lake Street, Chicago, Illinois.



Burgler-Proof Padlock

Probably the greatest contribution made to the lock industry in the last 88 years, according to the Dudley Lock Corporation, is the new, improved principle employed in their burglar-proof padlock. This consists of four rows of tumblers, instead of the usual single row, involving the use of a patented key with four operating edges, two on top, two on bottom. This apparently complicated, but actually simple arrangement of the tumblers makes it virtually impossible to align the tumblers in any way than by the use of the proper key. The company claims this solid brass padlock, fully protected by armored steel bonnet, keyhole plate, loosely-fitting guard pins, and shackle made of special steel alloy, to be practically impossible to pick, jimmy, drill, or saw.

Unique, also, is the Dudley system of positive key control which, it is said, eliminates unauthorized key duplication, for the key cannot be copied by commercial key machines. Duplicate keys are made only by the company. If you are interested in the Dudley burglar-proof lock, the principle of which is approved by Underwriters' Laboratories, simply write for illustrated catalog to the company in Chicago.

1940 All-Wheel-Drive Vehicles

Many engineering improvements and refinements in design are announced by The Marmon-Herrington Company for the 1940 models of All-Wheel-Drive trucks, commercial and passenger cars, which now make up the most complete line of high-traction vehicles on the market, according to the manufacturer.

Supplementing and completing the line, the company converts all standard Ford trucks, passenger and commercial cars to All-Wheel-Drive, thus claiming to give the buyer all the advantages of high tractive ability in medium and light weight vehicles at exceptionally low prices. Company releases say these All-Wheel-Drive Fords are amazing in their ability to perform over the most difficult terrain, such as rock and brush-covered hills and plains, deep loose dirt, sand, mud or snow. The relatively lighter weights of these trucks and passenger cars, coupled with the greatly increased traction of four or six-driving wheels, enables them to go places and do things no other vehicles would dare attempt.

The general offices and principal manufacturing plant of the Marmon-Herrington Company are located at Indianapolis, Indiana. Branch offices and distributing agencies have been established throughout the United States and in many foreign countries.

J.I. CASE *proves* NEW RPM DELO

(DIESEL ENGINE LUBRICATING OIL)

SATISFACTORY FOR SPARK-IGNITED TRACTORS

Order from Your Nearest Distributor as Listed Below:

IN THE UNITED STATES

"RPM" DELO:
The California Company (Montana only)
Humble Oil & Refining Company
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Standard Oil Company (Nebraska)
Standard Oil Company of California
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The Carter Oil Company, Tulsa, Oklahoma
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Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
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Kyso "RPM" DELO:
Standard Oil Company (Inc. in Kentucky)

Signal "RPM" DELO:
Signal Oil Company

Sohio "RPM" DELO:
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Imperia "RPM" DELO:
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"RPM" DELO:
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THROUGHOUT THE WORLD

"RPM" DELO is available through distributors in more than 100 countries.

CASE TRACTORS are great performers—have been for 47 years. So when New "RPM" DELO comes through extensive factory tests with the verdict—

"Satisfactory for Case Tractors operating on any fuel from gasoline to tractor fuel or distillate"—

This means it delivers cost-cutting, life-lengthening, profit-raising lubrication! Results of J. I. Case Company tests show: Combustion chambers free of carbon deposits—meaning cooler, smoother, sweeter-running engines! All rings free in the piston grooves. Blow-by and engine wear minimized—full-power performance assured. *Unfailing protection! Longer engine life!*

Profit by New "RPM" DELO in *your* equipment—in stationary, automotive, or marine service. It ends ring sticking. It's safe for *all* types of bearings.

RPM
REG. TRADE MARK
DIESEL ENGINE LUBRICATING OIL

New "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

STANDARD OIL COMPANY OF CALIFORNIA

For your convenience in writing to Standard Oil Company of California, you will find a card bound in this issue.

NOT in the Contract

The lady of the house suspected that one of her two sons was paying attention to the maid. Anxious to find out which one, she said to the girl:

"Norah, supposing you had the opportunity of going to the movies with one of my sons, which one would you prefer?"

"Well," replied Norah, "it's hard to say, for I've had a grand time with the both of them, but for a real rollicking spree, give me the master!"

This transfer has expired, madam.

Well, no wonder, with the air so bad in here.

Policeman (to motorist): Take it easy. Didn't you see that notice, "Slow Down Here"?

Motorist: Yes, officer, but I thought it was describing your village."

Contractor: "So you desire to become my son-in-law?"

Shovel Operator: "No, I don't. But if I marry your daughter, I don't see how I can get out of it."

He: let's get married or something.

She: We'll get married or nothing.

Boss: "Well, George, I hear you stayed in the haunted house last night. What happened?"

George: "'Bout twelve o'clock, a ghost came through de wall just like dey wasn't no wall dere."

Boss: "And what did you do?"

George: "Ah went through de odder side de same way."

The meanest man in the world was the ventriloquist who threw his voice under the old maid's bed.

In the legal world, what's right is right, and what's left is the client's.

The drunk weaved up the avenue and staggered into a beauty salon.

"Hello," he said, "ish thish the beauty shop?"

"Yes," replied the receptionist, "this is the beauty shop."

"Well, bring one out," sputtered the souse, "I'm lonesome."

"Cripes, Bergotti, we missed!"

Variations

O Engineers, with hairy ears
Designing dams and ditches
Controlling floods and blowing suds
And never reaching riches.
When you want fun your tastes don't run
To graphs and mathematics
But to "The Pub" or "Clover Club"
And ball-room acrobatics.
You make surveys of waterways
And plan for irrigation,
But H_2O to gin that's sloe
You add in moderation.
With stress and strain you ascertain
The ways to make frames rigid
Then spend the night, till broad daylight
In making dames less frigid.
O Engineers have hairy ears
I find them most endearing
But awfully odd, because by God,
They don't like engineering!

—Dona Newman

"Did you ever catch your husband flirting?"

"That's exactly how I did catch him."

Everybody got up but one man in the corner when the evangelist asked all who wanted to go to Heaven to stand.

"Do you want to go to Beulahland, my brother?" asked the evangelist.

"Sure!" answered the hopeless minority, "but I ain't going with any excursion."

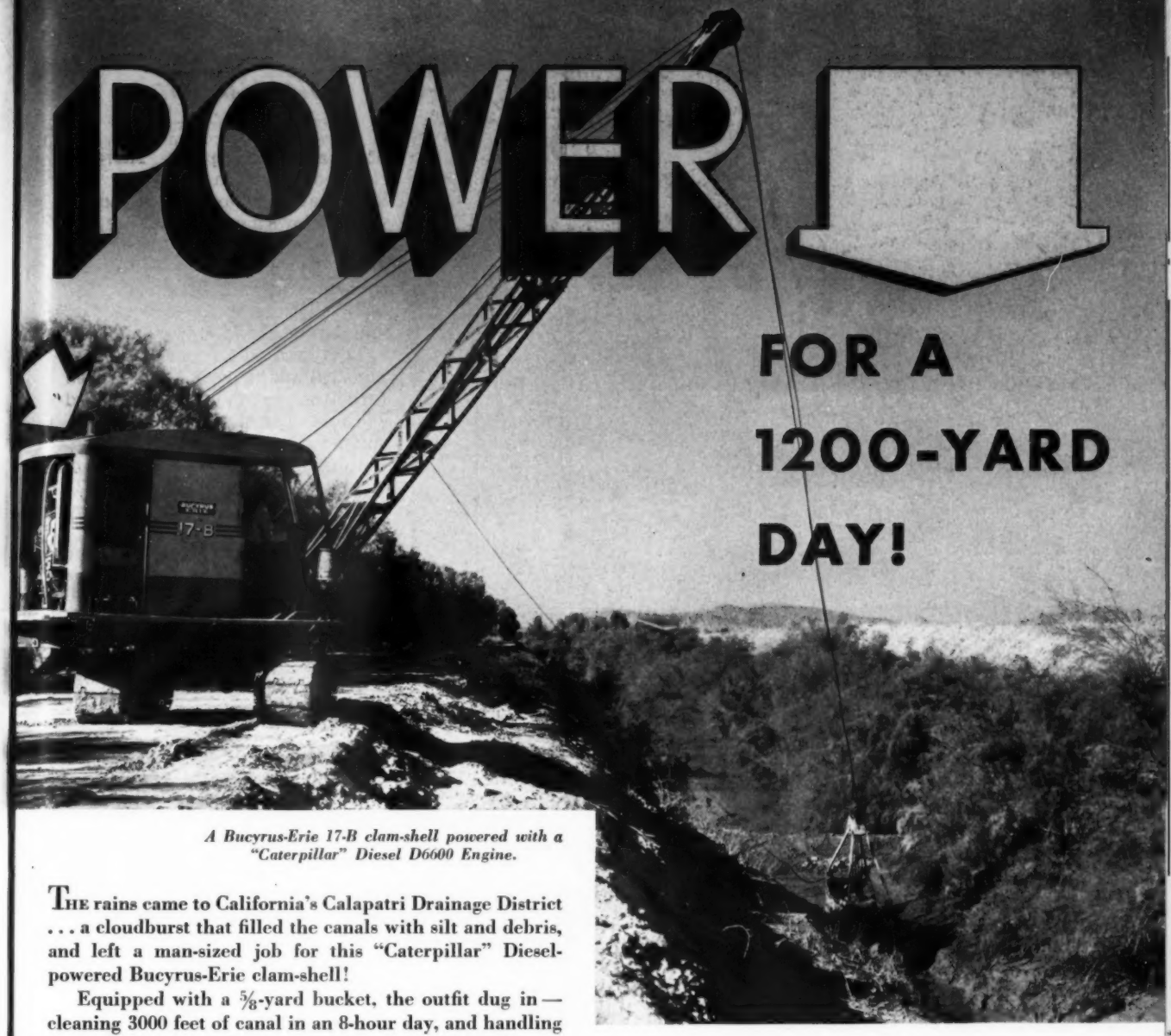
Two heads are better than one, except when one of them has a headache.

A colored church was organizing a Society of Virgins. One applicant came up carrying a baby in her arms.

"But, Sister," queried the secretary, "how come yo' figger y' is able to join dis here society?"

"Well," replied the woman, "I was only foolin' when this happened an' I 'lowed as how I could get in as one of dese Foolish Virgins.

POWER FOR A 1200-YARD DAY!



A Bucyrus-Erie 17-B clam-shell powered with a "Caterpillar" Diesel D6600 Engine.

THE rains came to California's Calapatri Drainage District . . . a cloudburst that filled the canals with silt and debris, and left a man-sized job for this "Caterpillar" Diesel-powered Bucyrus-Erie clam-shell!

Equipped with a ⅝-yard bucket, the outfit dug in — cleaning 3000 feet of canal in an 8-hour day, and handling as much as 1208 yards of material *in those 8 hours!*

Progress like that is largely the result of a "Caterpillar" Diesel Engine's ability to operate *without* wasted pick-up time — its lugging ability to take the load over the "hump" in short order!

But quick, accurate regulation under varying loads is only one reason "Caterpillar" Diesel Engines are the popular power for clam-shells . . . shovels . . . draglines . . . pile-drivers . . . compressors . . . pumps . . . crushers . . . electric welders . . . and practically *all other equipment!*

Consider the simplicity of these engines — their freedom from frequent and delicate adjustments, and their *absolute lack* of operating-adjustments on the fuel-system. Then there are records of stamina and long life — "Caterpillar" Diesel Engines with 15,000 to 20,000 and *more* hours of hard work behind them, and still going strong! And look at the completeness and availability of parts-and-service facilities. There is none finer, more dependable, or more easily had than those maintained by "Caterpillar." And, finally, there is the matter of fuel-cost . . . or, rather, of *fuel-economy*. Only a few gallons, at a few cents a gallon, will see a "Caterpillar" Diesel Engine through any day's work!

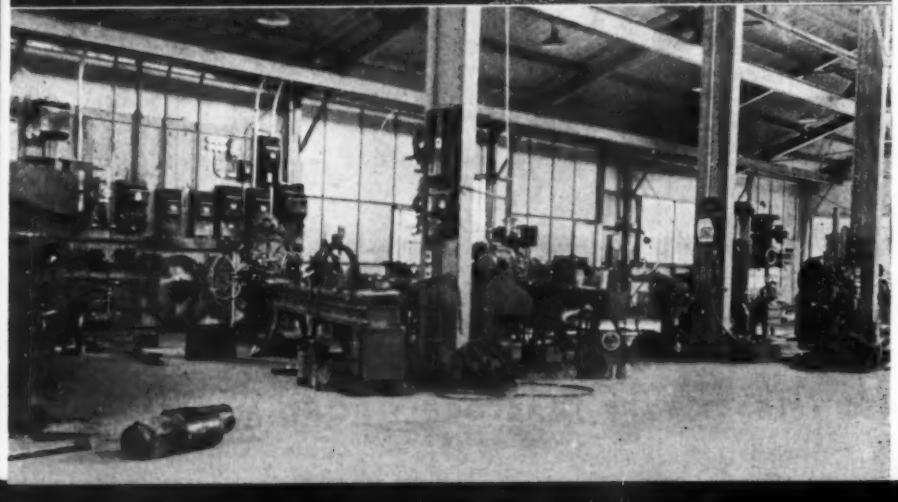
The next time you buy a piece of equipment, take a definite step toward making it profitable . . . *specify that it be equipped with a "Caterpillar" Diesel Engine!*

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR

REG. U.S. PAT. OFF.

DIESEL ENGINES • TRACK-TYPE TRACTORS • ROAD MACHINERY



Shasta Dam

(Continued from page 685)

State accident reports. There is close cooperation between the Safety and Medical Departments, which allows a good factual report of every accident. The centralization of reports at the hospital enables a more efficient management with a low cost for clerical maintenance.

The patient's comfort, both physical and mental, has not been forgotten in the planning and equipment of the building. Innerspring mattresses, individual nursing utensils, a blanket warmer, nurse's call system, and radio earphones for each patient are standard equipment.

The hospital is maintained on a full 24-hour basis. An ambulance equipped with a carbogen inhalator and emergency supplies operates out of the hospital. There is always a physician or registered nurse in attendance. In addition to serving employees of Pacific Constructors, Inc., the hospital has been opened to limited general cases of the general public, and to the contractors who are engaged in the building of the tunnels and bridges in the railroad relocation work.

The establishment and successful operation of this modern hospital by the Pacific Constructors, Inc., has proven the feasibility of the company-owned-and-operated hospital, and has established a yardstick for future medical and hospital facilities for large construction operations.

The shop area is composed of a machine shop, garage and warehouse, compressor plant and carpenter shop. The machine shop is equipped to repair practically any equipment on the job and maintains a crew of men three shifts a day. The garage and warehouse

● Top to bottom: (1) General view of residential area; (2) on the left, the large dormitory, on the right, the combination mess hall, post office, grocery store, pool hall, and barber shop; (3) view of carpenter shop, lumber yard, and machine shop; (4) interior view of the fully-equipped machine shop.

...GOOD THING
THEY USED EXCELLAY HERE
FROM THE DAILY REPORT OF A
TIGER BRAND WIRE ROPE ENGINEER
Yes sir—time is money on this job. They're working under a penalty clause. Tough digging slowed them down at the start, but the job is sailing along smoothly enough now, and it looks like they'll beat the deadline.
Just to make sure, I gave the wire rope a once-over today. You can tell it's had some tough treatment, but I'm sure it'll finish the job with plenty to spare. Good thing, though, that they used our Excellay Preformed Rope. Any other rope there would have given them trouble long ago.
Yours,
Al

TURN your wire rope questions over to a Tiger Brand Wire Rope Engineer. He lives and breathes wire rope, spends most of his time seeing it in action, checking its performance, studying ways and means of saving you money.

These engineers know what they are talking about, because they spend most of their time right out where the rope is used. They know what punishment it has to stand and how to stretch your wire rope dollar. Besides, they have no axe to grind—they are not interested in promoting any one construction or grade of wire rope over any other. For American Tiger Brand Wire Rope is made in all constructions and all grades.

USS

EXCELLAY *Preformed* **WIRE ROPE**

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York

COLUMBIA STEEL COMPANY
San Francisco

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

For your convenience in writing to United States Steel Corporation Subsidiaries, you will find a card bound in this issue.

● Top: The 120-B digs into the heavy rock of the west abutment. Bottom: Overlooking the area which will be under water upon completion of the dam. Terraces at the left were formed by material removed from the west keyway.

building provide for a six pit garage, washing room and grease pit, where all repairs made on the trucks, tractors, and shovels are handled.

Pacific Constructors, Inc., are moving over three million yards of rock and dirt on this job. The breakdown of the excavation yardage is as follows:

	cu. yds.
Stripping borrow pits	4,000
Common stripping for embankment	100,000
Rock stripping for embankment	5,000
Common excavation for foundation of concrete dam	660,000
Rock excavation for foundation of of concrete dam	1,500,000
Common excavation for powerhouse, penstocks, outlet pipes and spillway channel	120,000
Rock excavation for powerhouse, penstocks, outlet pipes and spillway channel	420,000
Common excavation for embankments, toe drains and cut off trenches with sloping sides	58,000
Rock excavation for embankments, toe drains and cut-off trenches with sloping sides	59,000
Common excavation for corewall footings	500
Rock excavation for corewall footings	3,300
Excavation, all classes for coaster gate structure	2,800
Excavation, all classes for grouting and drainage tunnels	2,600
Common excavation for roads and railroads	180,000
Rock excavation for roads and railroads	195,000
Common excavation in borrow pits and transportation to embankment	100,000
Total excavation	3,410,200

Pacific Constructors have a working agreement with the American Federation of Labor. There are thirty-seven affiliate unions working on Shasta Dam. A great deal of time and effort was spent in developing this labor agreement and it is believed that one of the best, most practical operating agreements existing in the country today is this contract. It is indeed hoped that this is the fact and that we are that much nearer to the "middle road." There is a maximum forty-hour week for all excepting those in an executive, administrative or advisory capacity, and maximum union wage scales prevail.

The area in which Shasta Dam is located is rather heavily covered with brush and second growth. It was necessary before any excavation was undertaken to clear the area to be occupied by the dam and power plant, of all this growth. The surface of all borrow pits and the right-of-way for roads was cleared of all trees, stumps, roots, brush and rubbish. All combustible material had to be burned. The first clearing crews went through the areas and cut all trees, piled and burned them. Then the tractors and bulldozers pushed out all the stumps and heavy brush. It was necessary during the clearing period to be extremely careful of fire as this area has been the scene of some of California's worst fires. In places where a road fill was to be made of not more than two and a half feet in height, trees, stumps and brush were cut off flush with the existing ground surface. Where road fills were in excess of two and one-half feet in height, trees, brush and stumps were cut off within six inches of the ground.

Handling the excavation are five Bucyrus-Erie shovels, two 120-B's, two 48-B's, and one 18-B. Due to the amount of excavation to be done it is necessary to use equipment that can give fast loading times, be sturdy and able to move about without more than normal precaution. It is often found necessary to change these shovels over to clamshell, dragline and hoisting cranes and with the design of the Bucyrus-Erie shovels, these change-overs are accomplished with a minimum of time loss.

When the 48-B and 120-B rigs

Massive elevating graders—pulled by International Diesel Tractors—make and maintain earth roads with speed and efficiency. This picture shows the big, powerful TD-18 Diesel TracTracTor and an International-powered 42-inch elevating grader owned by the Municipal District of Liberty, Alberta, Canada.

MORE *WORK* PER DAY... MORE *SAVINGS* PER JOB

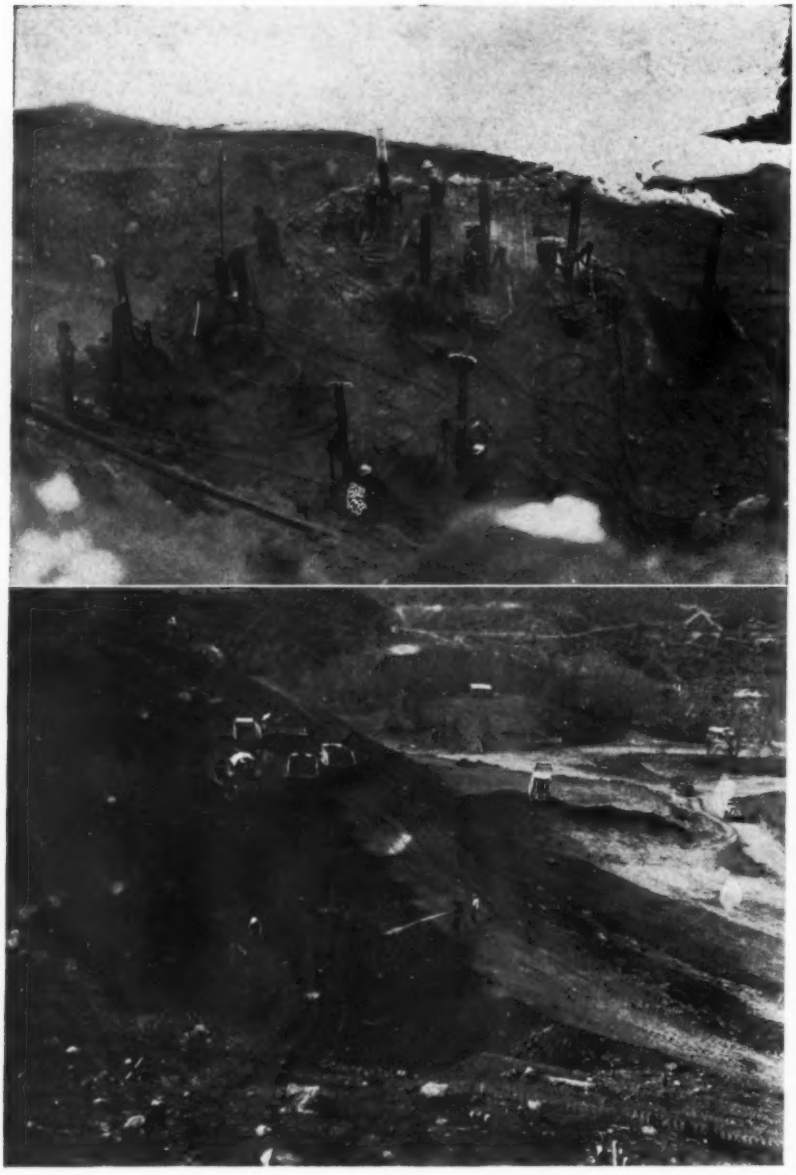
APPLY the versatile power of International Industrial Tractors to your operations, and *cash in* on their *performance* and *economy*. Throughout the industry, these crawlers and wheel tractors are licking the toughest jobs and conditions, and cutting costs to the bone. It's the preference for International among experienced users that recommends these units so highly.

You are sure to find exactly what you want in the International line—the wide variety of sizes and types, for gasoline, Diesel, and distillate operation, enables you to select the right tractor for the job. TracTracTors range up to the big, powerful TD-18 Diesel, the latest addition to this famous line of crawlers. Wheel Tractors are available in several sizes. In addition, International also offers a wide range of power units, and modified units.

See the nearby International industrial power dealer or Company-owned branch for complete details.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
180 North Michigan Avenue Chicago, Illinois

INTERNATIONAL Industrial Power



● Top: A flock of Ingersoll-Rand wagon drills put down holes preparatory to the excavating of the No. 6 runway of the cableway system. Bottom: Compacting fill on the east abutment with 'dozer, sheepsfoot roller and water.

are operated as shovels, the 48-B's use a two and one-half yard bucket, while the 120-B's use a four and three-quarter yard bucket.

Working on a 6-hour and 40 minute shift the 4¾-yard 120-B's handle an average of 248 yards an hour while the 2½-yard 48-B's handle 153 yards an hour. Excavation was started on the east abutment in September, 1938, with one of the 48-B's which was soon followed by the other shovels as soon as they could be rigged. Sand and gravel loading along the river's edge and general miscellaneous work in the yards is being handled by the 18-B.

The greater percentage of excavated material on the west abutment is waste dump with the balance, consisting of suitable aggregate, going into segregated storage piles. Excavated material on the east abutment is being put into graded stock piles for use in the earth embankment back-fill.

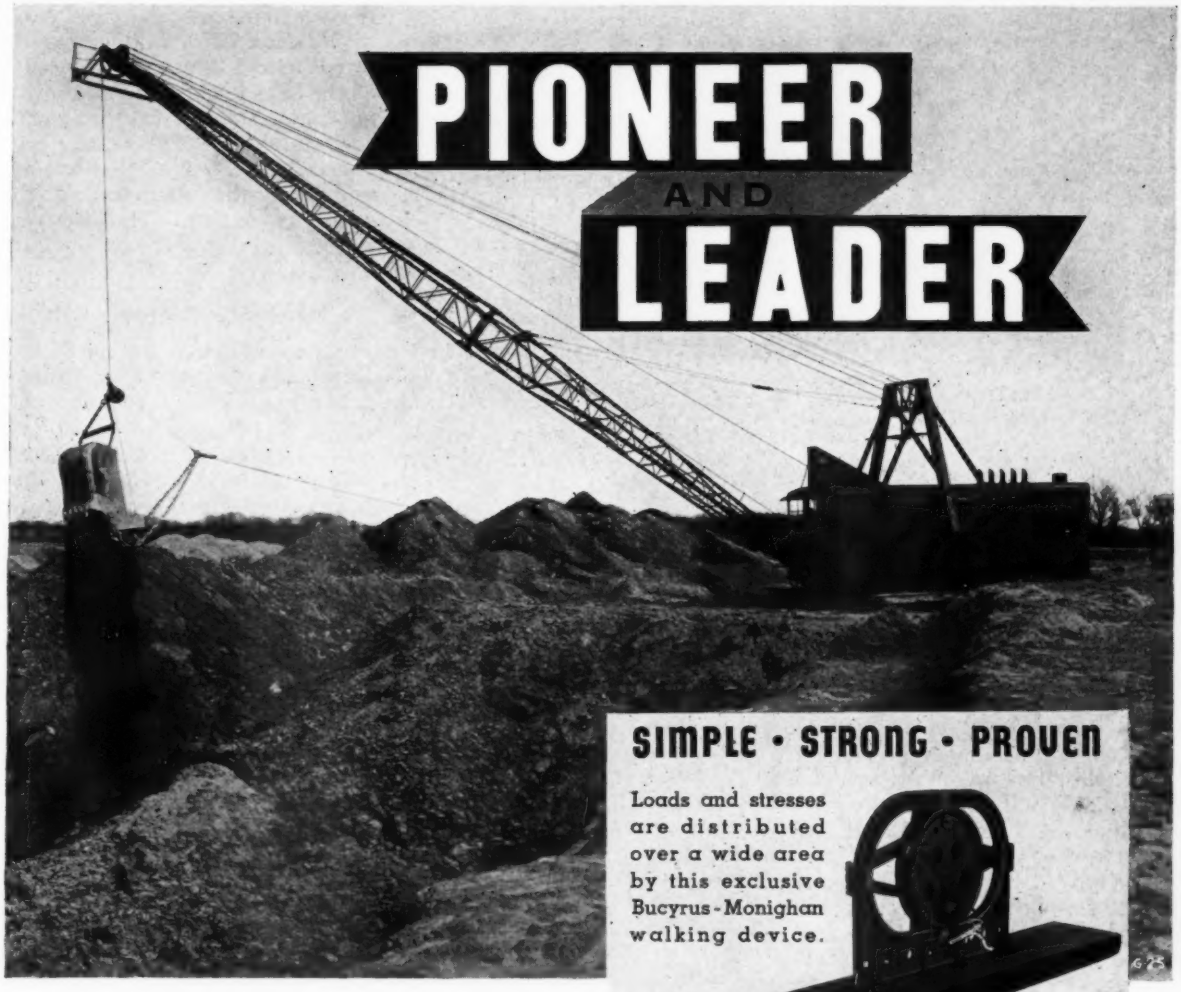
The trucking equipment consists of four-yard Ford dump trucks, seven-yard BF Mack dump trucks and twenty-five yard White dump trucks. The twenty-five yard White dump trucks are among the largest dump trucks ever built. These trucks are powered by butane fuel. The trucks are 128½" high (to top of bed), 111¾" wide, and roughly 294" over-all length. The beds of these trucks are 16' ¼" long, 10' wide and 62½" high. There are also eight RD-8 Caterpillar tractors and two No. 12 motor patrols working in the excavation and building of roads. Average haul lengths from the shovels to the dumps vary between two and five thousand feet.

The excavation at Shasta Dam, when compared to other dams that have been built in the past, does not begin to present the difficulties that were encountered on the other structures. The region in which the Shasta Dam is located is an old pressure region, dating back to prehistoric days and in this location are to be found many types of soils and decomposed weathered rock. For the most part, the excavation in the keyways was a rather simple procedure. The first ten to twenty feet was nothing more than common top soil containing the usual amount of surface rock, roots and stumps. The next layer was a brown, decomposed rock that was very brittle and with only occasional blasting could be easily handled with either the 48-B or 120-B shovels. Naturally, as the excavation went deeper into this brown rock, more blasting was needed. Bed rock was found to lie on an irregular slope that required a minimum of 75 foot cuts to 150 foot maximum cuts, and there are a few places where even that depth is exceeded.

Extensive Drilling Operations

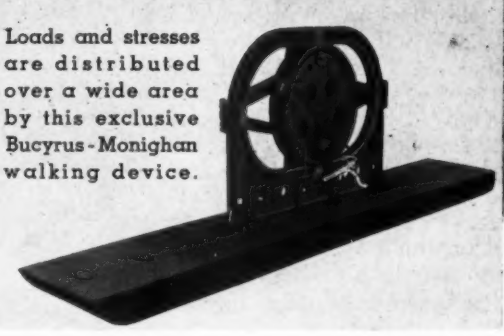
In the drilling for excavation, both wagon drills and jack hammers are used, but wagon drills are used whenever and wherever possible. The wagon drills, of which there are forty-two, are of the Ingersoll-Rand make—FM-2's with X71 drifters. There was about 2,000,000 cubic yards of rock to be excavated and in order to keep the cost as low as possible, it was necessary to drill a large

PIONEER AND LEADER



SIMPLE • STRONG • PROVEN

Loads and stresses are distributed over a wide area by this exclusive Bucyrus-Monighan walking device.



THE first Walking Dragline, a Monighan, was shipped in 1913. During the succeeding 27 years, hundreds of these machines have proved themselves along the muddy banks of the Mississippi, in the sands of the All-American Canal, the rocky terrain of the Pennsylvania Anthracite Region, the remote mines of Alaska, South America, Nigeria, and the Far East.

Originator of the Walking Dragline, Bucyrus-Monighan today offers you a machine which is the result of consistently progressive design based on an unbroken experience dating from the beginnings of draglines. The essential simplicity and strength that stand behind the big output of today's Bucyrus-Monighans can only be the heritage of a long and successful history.

Bucyrus-Monighan builds a complete line of walking draglines, with buckets up to 14 yards in capacity and booms up to 250 feet in length. Whatever your size requirements, you can choose Bucyrus-Monighan with the assurance that you are getting a field-proven machine.

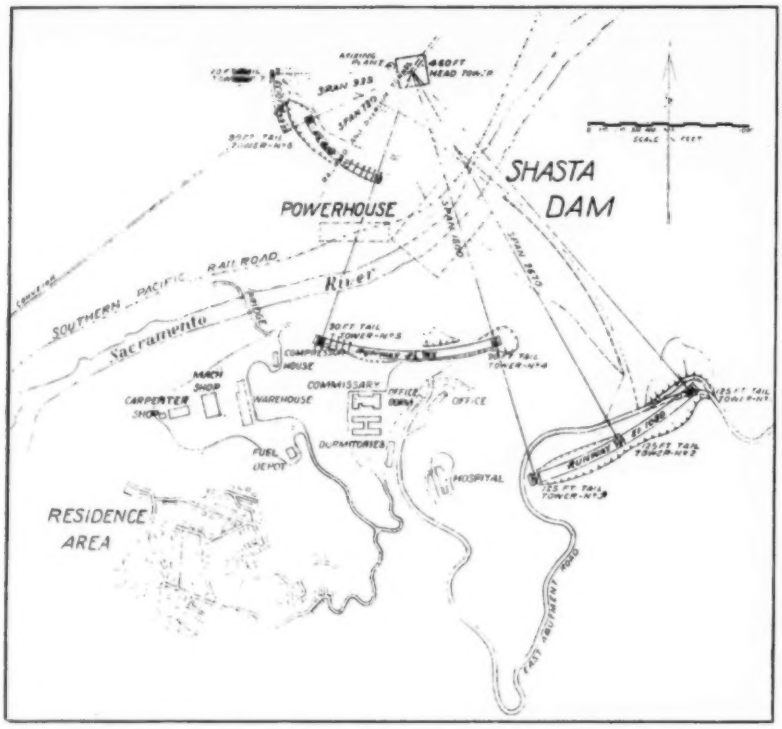
BUCYRUS MONIGHAN

Sold by

BUCYRUS-ERIE

SOUTH MILWAUKEE, WISCONSIN, U.S.A.

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.



● Sketch of the general layout of the Shasta Dam operations showing camp structures and location of cableway system for concrete placing operations.

portion of this amount with 20-foot holes. The wagon drills draw about 250 cubic feet of air a minute and they, along with all the other air equipment on the job, are supplied by welded air lines direct from the central compressor plant. In many cases, the distance by pipeline from the compressors to the air equipment was about one mile and the lift from fifty to four hundred feet.

Atlas powder is used for all blasting. Blasting operations at Shasta Dam are supervised by a man with many years of experience in this particular type of work. In much of the blasting, springing of the holes was done in order to get the required amount of rock. After the holes were sprung they were blown out with air and reloaded for the final blast. The shots are hooked up with bus wires and all shooting is done from specially built blasting shacks in which a competent electrician has charge of the actual setting off of the shot. There are very few times when blasting is done by way of the old battery-plunger type method.

One of the most difficult problems encountered was the planning of the pouring of concrete in the large span of the dam. This required the study of all possible methods that might be undertaken to pour the 5,600,000 cubic yards of concrete needed and which again is second in amount only to Grand Coulee's 10,200,000 yards. The unique plan that has been adopted for concrete placing operations is a cableway system that will have four runways on which will be seven tail towers; with all cables running directly from the tail towers to one central head tower. In all, the heavy construction that has gone on before this time a cableway system such as this one has never been used. (See accompanying diagram.)

The span of the cableways will range from 720 feet in length up to 2,670 feet in length. The seven tail towers will vary in height from 20 feet to 125 feet.

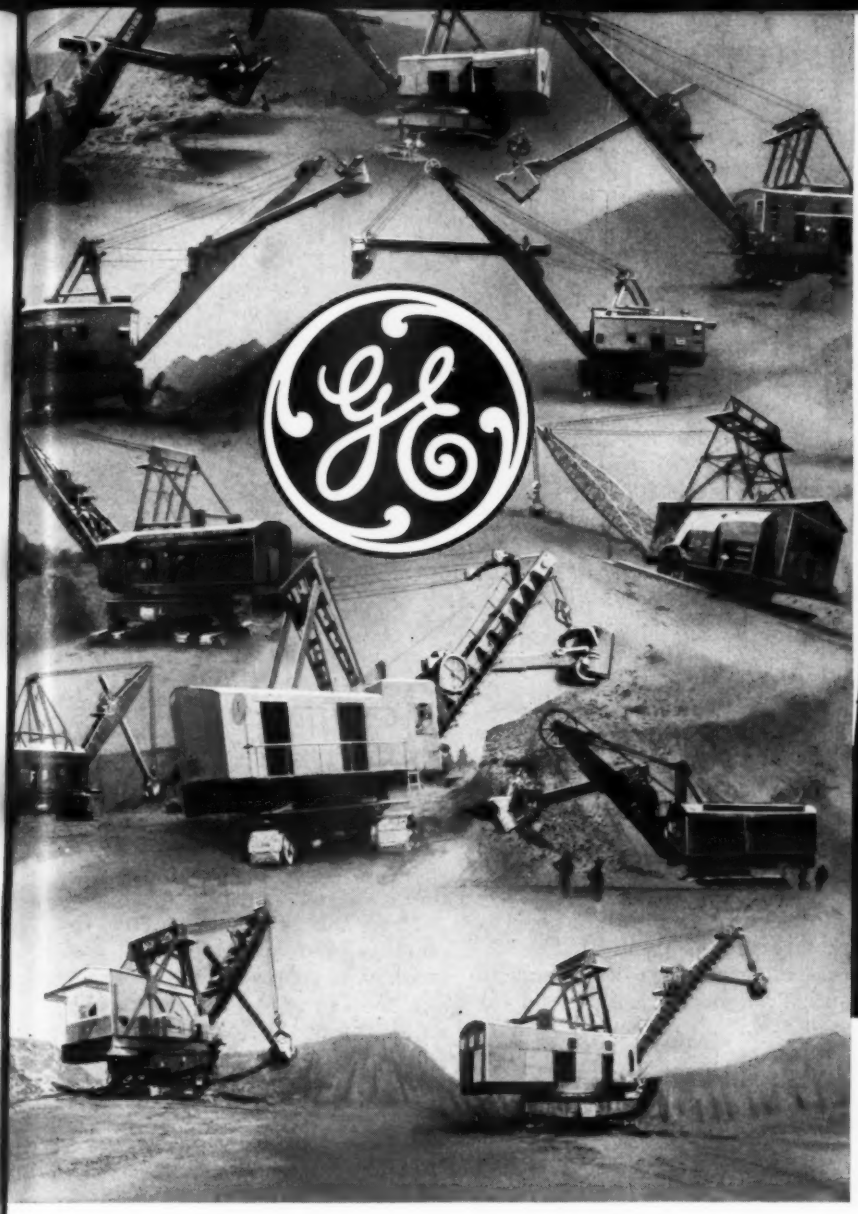
The head tower is a marvel of science and engineering. The structure is 460′ high, anchored by four legs embedded in concrete ranging from sixty to ninety feet deep. From elevation 810 this tower will extend to approximately elevation 1270. Besides having to withstand the tremendous pull of the seven cableways the tower must also support the equipment such as electric motors, controls, and cableway hoists that are required in the operation of the cableway system. The concrete mixing plant will be at the base of the tower.

Nine Mile Conveyor Belt

Sand and gravel for the Shasta Dam and power plant will be taken from the Kutras Tract, just north of the city limits of Redding. The conveyor will run from this point to the hoppers, a distance of 49,400 feet and will involve 24 flights with 24 drive stations. This conveyor will be more than twice as long as the longest conveyor system now in existence and will span the Sacramento River at two crossings, one at the gravel pit near Redding and the other at the site of the hopper at Coram. The belt will be 36 inches wide with about 4,300 horsepower available in the entire unit, with a requirement of 3,600 horsepower. The conveyor will handle approximately 11,000,000 tons of aggregate and will run at the rate of 600 feet a minute, carrying a maximum of 1,000 tons an hour.

From the hoppers, the aggregate will go to aggregate storage piles about a quarter of a mile away. Distance from the storage piles to the mixing plant is nearly one mile and requires that the aggregate be lifted about four hundred feet to the top of the dam, then lowered to the mixing plant some two hundred and fifty feet lower at the base of the head tower.

Although Shasta Dam at the present time is but a hole in the ground, in a few months webs of cableway systems will be spanning the canyon. Many men will be engaged in the actual pouring of concrete and the building of one of the wonders of the world will be completed. Truly, we should be proud of our great dams, for in time to come they will be looked upon with awe, much as we look upon the pyramids of Egypt and the engineering skill of the Pharoahs.



Electric SHOVELS Everywhere

. . .

G-E Equipped for Dependable Operation

OPERATORS throughout the world know they can depend upon G-E equipped shovels, despite the tough conditions of service that must be met.

Excessive dirt and moisture, high momentary overloads, an extremely rapid and variable duty cycle, and, frequently, the lack of facilities for proper maintenance are just a few of the reasons why the lot of electric-shovel motors and control is not a happy one.

But G-E equipment for shovels is designed for just such conditions. It includes, for example, the famous Type MD motors (also used extensively in steel mills), special three-field generators, and special controllers and contactors.

Basic Contributions

In addition to developing this equipment during 25 years of close co-operation with the shovel builders, G-E engineers have made such basic contributions to better shovel operation as the application of d-c apparatus, of the generator-field control principle with variable voltage features, and separately excited motors.

In recent years they have made many contributions to refinement and simplification that make possible even smoother, more flexible, and more economical shovel operation.

Why not get the entire story from the G-E shovel specialist in your territory? He can also give you full information about the engineering and renewal-parts service that becomes available to you when you buy a G-E equipped shovel. Then, when you are ready to order a new shovel or to remodel an old one—make it a point to SPECIFY GENERAL ELECTRIC EQUIPMENT.

GENERAL ELECTRIC

011-548

Air Tool Lubrication

(*Continued from page 689*)

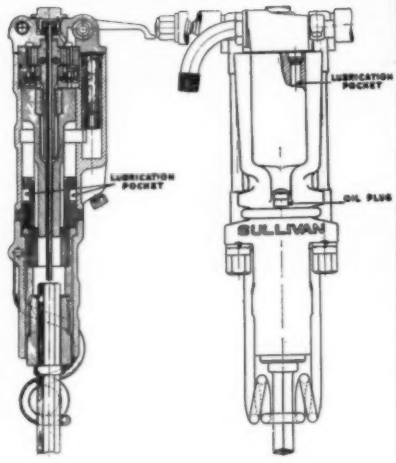
This ability on the part of the refiner is definitely measured by the research and experience he has accumulated over long years of testing and working with different types of lubricants and compounds. We stress again that this characteristic of "stability" in a lubricant cannot be described by any set of classifying figures of specifications. Hence, air tool lubricants should only be purchased from a reputable source and not bought, because of price, at a roadside vegetable market.

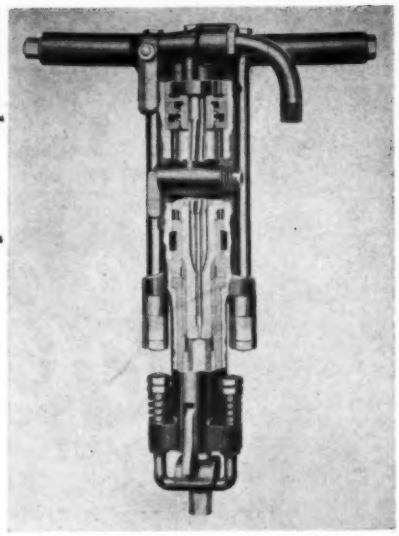
Must Have Protective Value

Number four on the list of good oil characteristics is protective value. This matter of protective value afforded by a lubricant, embraces a multitude of sins. Protective value is not just one characteristic that may be measured such as "flash or pour points." It is a tight correlation of every need the lubricant will be asked to satisfy in an air tool. It means the ability to cling to moving parts and maintain the minute oil films that eliminate wear. It means that the lubricant must have a sufficient toughness of oil film so that it will not be ruptured by high bearing and cylinder pressures. It must have a high degree of oiliness to continue its protection even when it is not possible to set up conditions where oil films of appreciable thickness can be formulated.

The lubricant must continue to have this protective value after the air tool has ceased to operate, such as at the end of a day's work. Water, present in air tool operation, will quickly corrode highly polished cylinder wall surfaces and finely finished bearing areas if the air tool remains inactive even for over night periods. Here the lubricant, by its protective value alone, must coat and maintain that oil coating to prevent rusting and metal pitting.

No number or specification can be written to gauge this characteristic of protective value in a lubricant. Just as in the foregoing requirement of chemical stability, this characteristic is dependent entirely upon the ability and the skill of the oil refiner who makes the air tool lubricant. No price per gallon either high or low, will give us a clue as to how to select our lubricant for the highest degree of protective value. Its selection must rest entirely on known records of the oil itself to do a proper job of lubrication.





● Left: Sectional view of a Sullivan L-9 hand held drill showing oil plug and lubrication pockets. (Photo courtesy Sullivan Machinery Co.) Right: Cross section view of the Gardner-Denver S55 jackhammer. (Photo courtesy Gardner-Denver Co.)

Quality Lubricants Solve the Problem

In the foregoing discussion of a suitable lubricant for air tool operation, it might appear to our reader that we have made the question of its selection a complex problem. This was not our intention. Tool designers have done a great job of anticipating the hazards of improper lubrication and have so designed modern air tools to a point where they are nearly "fool-proof." The tool manufacturer has called upon his metallurgist to supply him with the finest of metals capable of standing up under the continuous shock loadings of air tool service. Many forms of "lubricators" exist that will adequately supply the needed oil to moving parts. Oil seals have been developed to a point where not only is the lubricant kept where it should be kept, but also to keep abrasive foreign matter from reaching the finely machined parts where it may cause damage.

Many things have been done to simplify the protection of air tools. As a matter of fact, air tools can be lubricated with the cheapest or the poorest of lubricants—*for a time.* The point we have tried to make is, that by the intelligent selection of the lubricant, the period of efficient air tool operation may be extended indefinitely. The air tool will pay dividends in terms of continuous and reliable operation with the minimum expenditure for parts replacement and maintenance, if the proper oil is used and not one that has been chosen haphazardly.

Editor's Note: Many manufacturers can and do recommend specific lubricants. The following is a typical recommendation by the Gardner-Denver Company—"The specifications which we will mention are general and should be discussed with the oil representative furnishing the lubricant. Under average conditions we recommend an oil having a viscosity of approximately 800 at 100°. An oil which does not change viscosity rapidly with the change in temperature, is to be preferred. The S.A.E. rating should be from 40 to 50. The flash point should be at least 390° Fahrenheit, fire at 420° or more. The neutralization number should be within government specifications, to be sure that no excess acid is present to cause corrosion. The carbon residue should not exceed .2. Film strength determined on a Week's tester, should exceed 3,000 pounds. The lubricant should contain a small percentage of saponifiable matter, sufficient to produce an emulsion in the presence of moisture. From 3% to 8% is enough to form a satisfactory emulsion without danger of retarding the valve motion, as that reduces drilling speed. This effect is noted in oils which contain too large a percentage of rape seed.

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Rebuilding the Mohawk Trail

(*Continued from page 693*)

zero temperatures can hardly be described adequately. Under such conditions as these, practically all the concrete on the job, totalling more than 25,000 cubic yards, was poured.

In addition to water and weather troubles, the contractor faced a lack of available aggregates in the vicinity of the work. This problem was partially solved by the setting up of a ready-mixed concrete plant in nearby Charlemont by the Whittemore Company of Boston. However, it was still necessary for C. J. Maney Co., Inc., to supply much of its own concrete, and to this end a batch plant was installed and operated on the job, as well.

Sand and stone had to be hauled from Greenfield, Massachusetts, a distance of 24 miles from the contractor's field office in the Cold River valley. Imagine making a 48-mile round trip for a load of crushed stone or usable sand! But that's what the contractor was up against, so a small fleet of eight to ten 7-yard dump trucks was kept busy on this work, assisted occasionally by the Autocar and Sterling trucks previously mentioned.

The sand and stone, hauled from Greenfield, was stored in bins at the batch plant near the field office. From this point this material was loaded into batch trucks by a Barber-Greene loader and hauled to the mixers. Several Fords and a small Mack truck were used as batch trucks, and two 27-E Koehring pavers mixed the batches.

The cement was delivered to Charlemont by rail and hauled to the job in 1½-ton International trucks, where it was stored under cover at the batch plant.

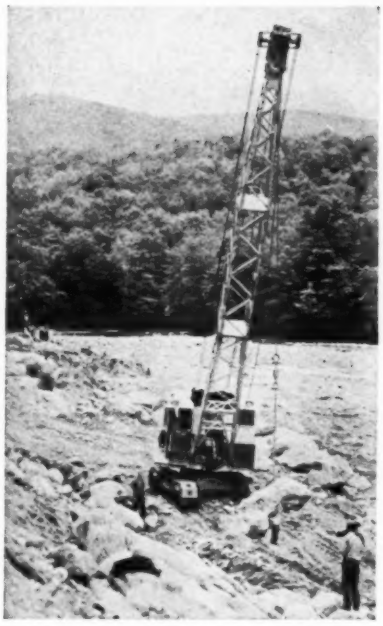
Concrete Materials are Kept Heated

Heating of the materials, and cold weather protection in all its phases, was, of course, another major problem in handling the concrete work. At the batching plant a large upright steam boiler was set up and steam lines were run from it through the materials. Tarpaulins were used as coverings to retain heat. As might be expected in sub-zero weather, it was necessary to keep the concrete materials heated continually . . . a 24-hour-a-day proposition.

Calcium chloride was added to the mix, and the water which was supplied to the mixers from the river by 2½ inch force pumps, was run through pre-heating coils. In addition to these precautions, it was still necessary to keep the drums of the mixers heated by Hauck gasoline heaters. The poured concrete was kept covered in the usual manner with tarpaulins, and salamanders were kept going 24 hours a day. The quality of the concrete, so thoroughly protected from the cold at every stage, turned out to be superior, and well worth the trouble taken to guard it.

Channel excavation operations were carried on simultaneously with the construction of the retaining wall trench and placing of the concrete. Snow, ice and deeply frozen earth, as well as the boulders and debris were constantly being dug out of the riverbed and disposed of.

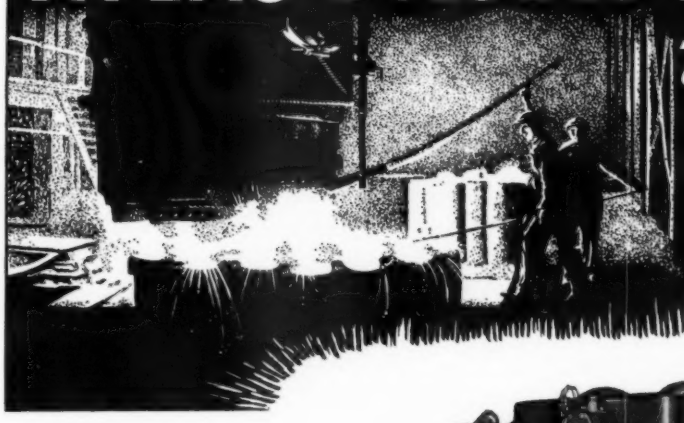
At "Dead Man's Curve," near the western end of the job, Cold River, which joins the highway at this point, makes a sharp turn to the right in its downward course. During the flood the highway fill at the outer edge of the turn of the river, and extending many feet above the riverbed, was seriously washed out. It was decided,

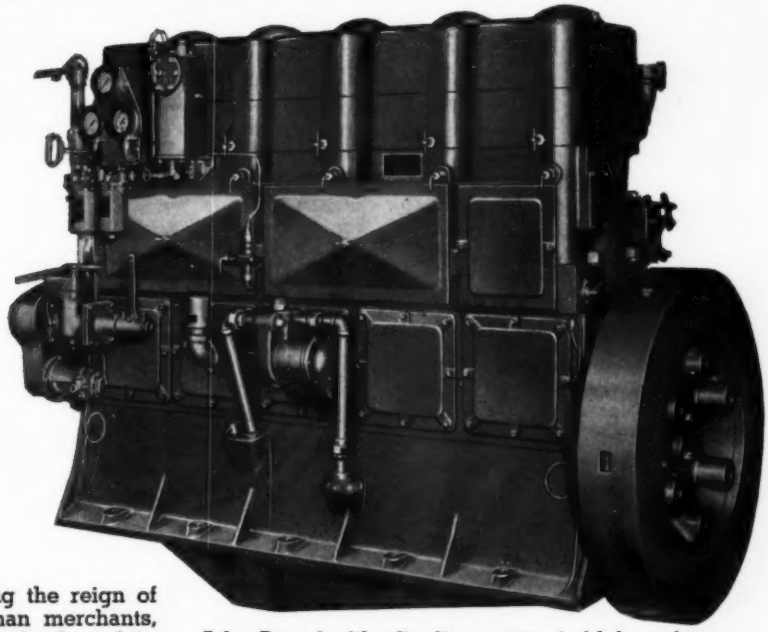


● With the aid of a sling, this Bucyrus-Erie 34-B crane placed oversize rock along the embankment.

● Left: Genial Mike Taurasi was the "super" on the job. Right: Albert Rockwood was the assistant superintendent.

ATLAS DIESELS *have been through the* FIRE





The "STERLING QUALITIES" of Atlas Diesels are characteristic of the entire line, which covers a power range from 5 to 600 H.P. For contractors, there are small electric generating sets for camp and construction lighting; and a wide choice of engines for powering excavators and rock crushing plants.

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Their coins had been through the fire and the metal thoroughly refined. Impurities had been removed until "Sterling" stood for 925 parts silver of every 1000 parts of metal. Down through the centuries, Sterling has been regarded "tops" in silver, and in 1907 was given legal status by United States law.

Atlas Diesels, like Sterling coins of old, have been "through the fire" and thoroughly refined. Poured through the crucible of operating experience, as provided by the construction, oil, marine and manufacturing industries, they have come through unsullied. They have earned their stripes for dependability, economy of operation and low cost maintenance.

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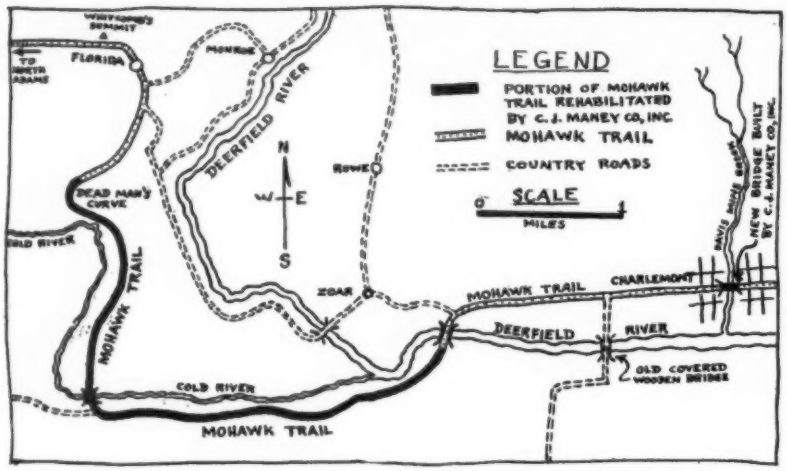


● A rough sketch by the author, showing the general location of the rehabilitation work.

therefore, to relocate the river channel by cutting across the narrow mountain spur, around which the river was flowing, thus smoothing out the sharp turn of the river.

Accompanying illustrations show the former and present appearance of the channel, but they cannot begin to show the difficulties encountered in cutting through this spur in the middle of a sub-zero winter.

Drilling and Blasting Necessary

Not all of the channel excavation consisted merely of the removal of boulders and debris, and not all of the footing trench excavation was through loose material of the same sort. Large quantities were in ledge rock, which necessitated drilling and blasting under conditions which were decidedly adverse. All of the drilling was done with jackhammers because of the need for easy mobility. Compressed air was supplied by a 310 cfm Sullivan, a 260 cfm Worthington and a 210 cfm Metalweld, moved about as operations required.

The job included long runs of drainage pipe, varying from 6 inch perforated bituminous coated corrugated metal to 60 inch reinforced concrete pipe and various sizes of cast iron pipe. Most of this work, too, was performed in sub-zero weather.

About the middle of April, 1939, excavation and retaining wall work had progressed to a point where actual road work could get under way. Throughout the winter months much excavated material from channel and trench excavations had been hauled and dumped as fill for the road, yet it was necessary to store the greater part of this excavated material so that a vast amount of rehandling was necessary when actual work on the highway was started. In addition, several thousand yards of borrow had to be brought in from other sources.

Handling and grading of rough fill from channel and trench excavation and from storage piles was done with the previously mentioned shovels, trucks and three bulldozers mounted on one RD-7 and two RD-6 Caterpillar tractors. These bulldozers had been used constantly throughout the job, maintaining temporary roads, plowing snow (for which purpose trucks were also used), doing rough grading and for many other miscellaneous jobs, such as pulling trucks out of the river.

Gravel borrow followed close on the heels of ordinary borrow and previously stored fill material. Here, again, the bulldozers did their stuff, helped by an Austin-Western 77 grader.

Toward the middle of May, 1939, the ruin and desolation which greeted the C. J. Maney Co., Inc., in October, 1938, was visibly supplanted by something which looked a little bit like a road. Actual surfacing was started and pushed through speedily, and the rehabilitated highway was thrown open to traffic on Saturday, May 27, 1939, only seven months after the contractor's staff first set foot on the job.

Cleaning Up Operations

But the work wasn't completed yet. There still remained a considerable amount of rip-rap, stone embankment, grouting, fine grading, fencing, concrete curbing and other miscellaneous items, as well as final completion of many of the other operations described earlier in this article. The remaining work, however, was accomplished without the slightest interruption of traffic.

The rip-rap was placed by the 34-B and the 32-B Bucyrus-Eries and the 301 Koehring, all rigged as cranes. Approximately 10,000 cubic yards of this material was placed by these machines.

Rip-rap was placed above the retaining walls as an added protection and grouted with three different mixes . . . 1-2-2, 1-1½-3 and 1-3 . . . depending on conditions and desired application. A 27-E Koehring paver was used for mixing, and the materials were batched from the contractor's plant.

Rock embankment placing was handled by a 33-B and a 37-B Bucyrus-Erie shovel. Fine grading, fence work and concrete curbing were cleaned up in short order after the completion of the preceding items and the job was finished after a general cleaning up.

New Bridge Also Built

Along with the reconstruction of the Mohawk Trail, C. J. Maney Co., Inc., tackled the rebuilding of the bridge over Davis Mine Brook at Charlemont at the same time.

This bridge, an old single span reinforced concrete structure approximately 80 feet in length, had been completely washed out and demolished by the September, 1938, flood. Before work could be started on the new bridge the old structure had to be broken up where it lay in the bed of Davis Mine Brook and removed piecemeal. Old bridge abutments were repaired, enlarged, and strengthened and on the west side of the brook, to the north of the bridge,

(Continued on page 725)

MONEY SAVING *Accessories*

Blocks and Linings

Beco Blocks and Linings take the heavy loads at the increased speeds demanded of modern excavating equipment. These Beco products are durable and tough — that's why replacements and adjustments are less frequent.

Rope Sockets

Bulldog wedge rope sockets never fail. The harder the pull . . . the tighter the grip! Attachment is easy and quick and directly in line with pull, eliminating costly kinks. Made in a dozen sizes and four different styles. Write for bulletin.

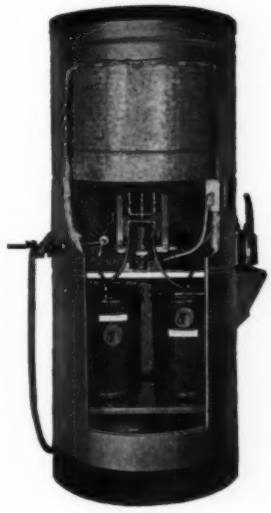
Wire Rope

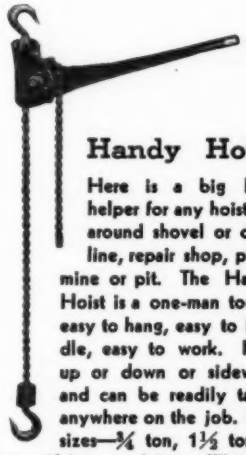
Selected by the men who build your excavating and drilling machinery, Bucyrus-Erie rope has the special features that spell better performance. B-E wire rope has a uniform high quality, and comes in the right sizes, types, and construction for your exact needs. Send for wire rope bulletin

New Bucyrus Oil Reclaimer

With the NEW Bucyrus Oil Reclaimer, used oil is reclaimed by a simple washing and filtering process at an average cost of about nine cents per gallon. It is a scientific fact, arrived at by leading research engineers and chemists throughout the country, that engine-use breaks down only the weaker and unstable molecules of your oil. These constitute about 10 per cent of the oil—the other 90 per cent, the strongest particles of the original oil, can be separated and cleaned for re-use by the NEW Bucyrus Oil Reclaimer.

Investigate the possibilities of the Bucyrus Oil Reclaimer before you discard another quart of used oil.





Handy Hoist

Here is a big little helper for any hoist job around shovel or dragline, repair shop, plant, mine or pit. The Handy Hoist is a one-man tool—easy to hang, easy to handle, easy to work. Pulls up or down or sidewise, and can be readily taken anywhere on the job. Five sizes—¾ ton, 1½ ton, 3 ton, 4½ ton, and 6 ton. Write for descriptive literature.

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No matter how unusual your "push, pull, clamp, or straightening" problem may be, BECO Jack is the tool that gives you a safe, sure, and proved means of doing the job better. Screw lengths—10", 12", 14", 16" and 18". Capacity 35,000 lbs. Send for bulletin.

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Shots from the FIRING LINE

Turnpike Passes First Anniversary

The Pennsylvania Turnpike, observed its first anniversary of construction October 27 and reviewed a feverish pace of activity that has established new road-building records for the entire country. (See Excavating Engineer, October, 1939, for a complete description of the Turnpike.)

It was on October 27, 1938, that construction of the 160-mile super-highway between Harrisburg and Pittsburgh actually began. Standing on a wind-swept field in Cumberland County, Chairman Walter A. Jones broke ground, the signal that swung the contractor's equipment into action. Today, over that same spot, stretch four lanes of concrete roadway divided by a 10-foot separation strip.

And over the entire distance the Turnpike already has taken the definite shape of America's pioneer super-highway. In fact, practically every mile may now be traversed by Commission officials, contractors' representatives and other authorized persons. Such a construction record has been enabled by the greatest concentration of road-builders' equipment in the country at any one time, representing an estimated investment of approximately $30,000,000, and the Turnpike Commission's emphasis for speed throughout its entire plan-schedule.

Seven more months' time remain until the June 29, 1940 deadline. With completion of the Turnpike on that date, the Commission will in 20 months have built a road that under normal highway building practices would take from three to four years to complete.

Records show that the 55 contractors on the job have worked their men over 61,000,000 man-hours, and have paid them more than $4,600,000 in wages. At present 11,800 men are directly employed by contractors, while more than 1,500 engineers, designers, inspectors, office workers, and legal and accountant personnel make up the forces of the Turnpike Commission.

At the 1st of November the Turnpike contractors had earned more than $14,000,000 for work completed, and had been paid more than $12,500,000. These contractors have excavated more than 18,700,000 cubic yards of earth and rock, poured 100,000 cubic yards of concrete, and placed about 15,000 tons of steel.

Excavation is 85 per cent completed. The tunnel boring is about 17 per cent completed, and paving is about 6 per cent finished. The entire job is about 30 per cent finished. More than 150 structures have been completed, and nine miles of four-lane pavement have been laid.

Fifty-five contracts have been awarded, with a total value of $39,675,725.49. Of these, 12 are fully completed, seven others are more than 75 per cent completed, and 12 others are more than 50 per cent finished.

● A Bucyrus-Erie ¾-yard shovel shifts a stream bed by cutting into one bank and dumping on the other in order to facilitate road widening operations in Vermont.

Vermont Improves a Secondary Road

On Route 110 in Vermont, just north of the town of Chelsea, the state is widening, straightening and grading about 8,000 feet of highway, and laying an 18-inch course of gravel. Winding through green hills and woods, beside a stream, this road is typical of hundreds of miles of secondary highway in Vermont.

The toughest part of the job was moving the stream in several places to permit building fills and prevent the possibility of flood damage. To handle this work, as well as several side hill cuts, necessary stump removal and fills, the state rented a ¾-yard Bucyrus-Erie 20-B from R. F. Carpenter, whose home office is in Alburg, Vermont. This shovel had just finished a flood-repair job in the southern part of the state. Roots, rocks and gravel that had to be moved in shifting the stream bed, made the excavating job a difficult one to handle at high speed. In addition, the shovel had to leave the stream, climb the bank, and walk down the road to safety when the state forces blasted stumps from the right of way.

Since the 20-B was, except for trucks, the only road-building equipment on the job, it had to be a jack-of-all-trades. Digging out the blasted stumps was only one of the odd-jobs it handled.

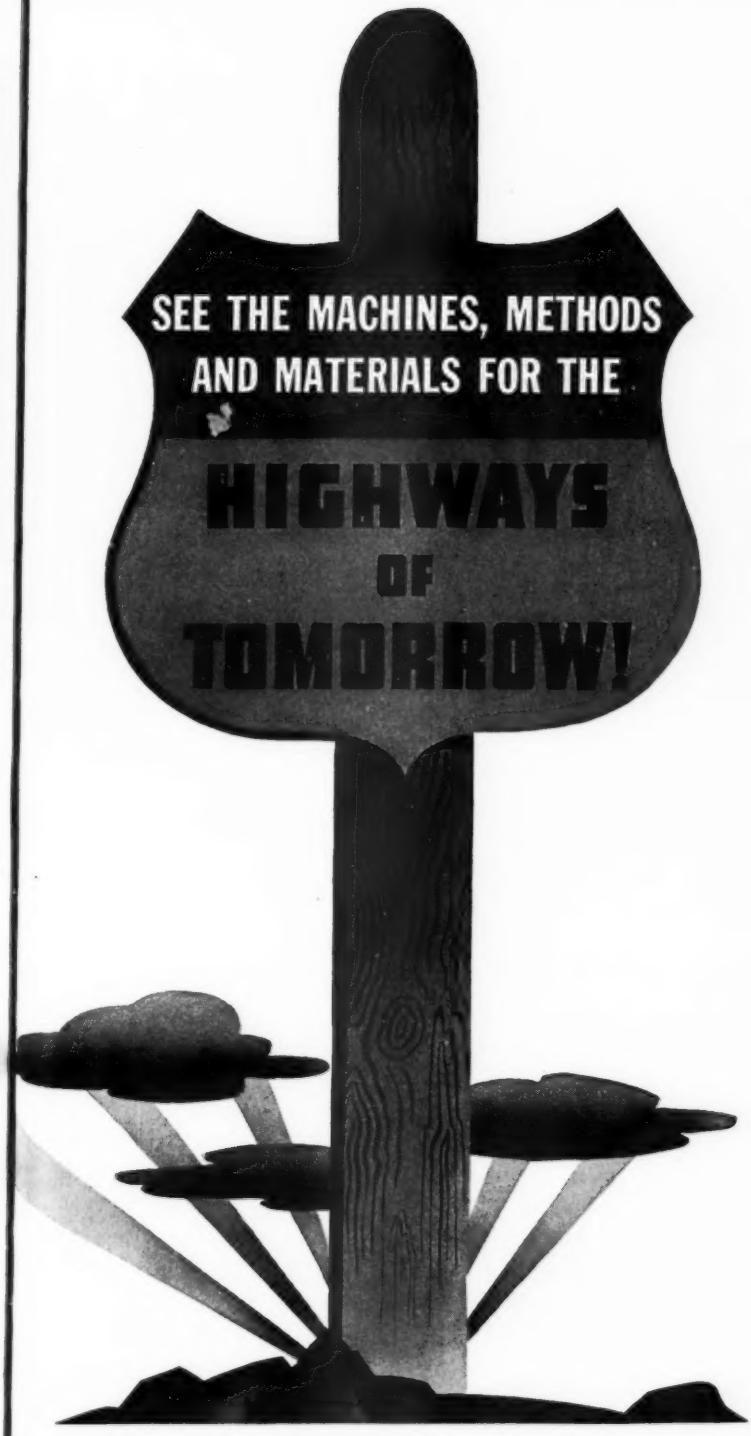
A total of $15,000 had been allotted by the State of Vermont for this particular job. Original plans, however, called for improving only 5,200 feet of road for this figure. At the time our photographer visited the job, no additional allottment had been made for the 2,800 feet of road added to the orginal schedule.

Highway Research Meets

From Washington, D. C. comes announcement of the Nineteenth Annual Meeting of the Highway Research Board, to be held this year from December 5 through 8 at the National Academy of Sciences. Department meetings will be held on Tuesday and Wednesday, and Board meetings on Thursday and Friday. Considerable time has been set aside for informal discussions in view of the success which that policy met with last year.

According to a tentative schedule released by R. W. Crum, Director of the Board, sessions of the Departments and Committees will probably be held as follows: Tuesday morning: Soils, Materials and Construction, Roadside Development; Tuesday afternoon: Joint session on Soils and Design; Roadside Development. Wednesday morning: Economics, Maintenance, Joint session on Design and Traffic; Wednesday afternoon: Traffic, Design, Joint session on Finance and Economics.

In the Board meetings proper, Thursday morning topics will include Finance and Economics, with afternoon sessions on Materials, Construction and Soils. On Friday the subjects will be Traffic and Maintenance in the morning



CONTRACTORS! Engineers! State and County Highway Officials! Here's your chance to see, compare and evaluate for yourself every recent development in the long line of machines, methods and materials you use on your jobs!

That's right, the A. R. B. A. Road Show and Convention is a grand opportunity to get off to the right start in 1940—to get together with the men who know your problems; to talk shop with old friends and make new ones; to get a line on how your business is going to shape up in 1940! Make no mistake—you're giving yourself a break when you plan to attend the 1940 A. R. B. A. Road Show in Chicago on January 29 to February 2.

OME TO THE 1940 A. R. B. A. ROAD SHOW AND CONVENTION

nternational Amphitheatre • Chicago • January 29 to February 2

● Against a background of scenic splendor this FWD five-ton truck and the attached grader do some general road maintenance work above the timber line on Pike's Peak Mountain for the Colorado state highway department.

and Design and Roadside Development in the afternoon.

Fort Peck Dredging Operations Completed

Another major item of construction at Fort Peck Dam was brought to a close last month when dredges Jefferson and Missouri completed the placing of hydraulic fill in the upstream berm of the main dam. Although the work of the two dredges is completed, the dam lacks about 25 feet of being up to its final height, and earth fill will be placed by rolled-fill methods in 1940 to complete, or "top out," the top section of the dam.

Dismantling of the pipelines and dredge equipment was started immediately after the shutdown of the dredges. At the upstream berm, crews began to remove pipelines, and earth-moving equipment followed close behind to slope the fill to final grade. To facilitate the removal of dredge equipment, a railroad spur, 2100 feet long, has been constructed from the Wiota-Fort Peck Railroad to the vicinity of dredge Jefferson. Additional track will be laid in this vicinity as required. Dredge equipment and pipe and miscellaneous construction equipment which is no longer needed at Fort Peck are being moved to a storage yard near the Government warehouse where they will be stored until transferred to another Government project or disposed of in some other manner.

The first dredging operations at Fort Peck were started in October, 1934, by dredge Gallatin. The Gallatin had been constructed at the damsite in what has been termed the largest inland boatyard in the world, and later construction in this boatyard added three more dredges and auxiliary plant to the dredging fleet. All of the dredges are electrically-operated suction-type dredges capable of excavating material to a depth of 52 feet below the surface of the water. The operation of the dredges has been unusual because of the length of pipeline through which material has been pumped and the height to which this material has been lifted. During the 1939 dredging season, material was pumped through a pipeline 6½ miles long with a lift of 228 feet, using 10 pumps at various positions along the pipeline. The quantity of fill material pumped by one dredge under these conditions exceeded 50,000 cubic yards during a 24-hour period.

The dredges placed 13,694,000 cubic yards of material during 1939. The total hydraulic fill now in place in the dam is 122,178,000 cubic yards.

Another Contra Costa Contract Let

Construction of an additional nine-mile section of the Contra Costa Canal, Central Valley project, California, has been assigned to the Heafey-Moore Company and Frederickson & Watson Construction Company of Oakland, California, on their low bid of $276,365.

The award of contract for this particular job was delayed in order that the Department of Labor could give further consideration to the determination of wages for the various crafts on the Contra Costa Canal project. A hearing was held at Antioch, California, and complaints concerning the wage rates previously determined have been withdrawn. Embodied in this contract are the wage rates determined by the Assistant to the Secretary of Labor on April 10, 1939.

This new section of the 46-mile Contra Costa Canal extends from Mile 20 to Mile 29 and includes in addition to excavation work, five siphons, four highway culverts, several bridges, and the 5,772-foot Nichols wasteway leading from the canal to Suisun Bay. The contract also will cover a separate 1,000 feet of canal north of Pacheco, consisting of a long siphon under the proposed four-lane Willow Pass Industrial Highway. The contractor will be allowed 500 calendar days in which to complete the job.

More than half of the Contra Costa Canal is now under contract. Construction is virtually completed on the first 12 miles, except for the four pumping plants which are about half completed, and construction is three-fourths completed on an 8-mile section.

An important unit of the Central Valley project, the Contra Costa Canal, extending from near Knightsen at the West end of Rock Slough along the south side of Suisun Bay to a small reservoir above Martinez, will afford a supplemental supply of fresh water to industrial plants along the south shore of Suisun Bay, to an upland area of orchard and field crops, and to several Contra Costa County municipalities.

New Jersey's 1940 Highway Plans

Recommendations for New Jersey expenditures of $11,816,632 on new state highway construction in 1940 are included in a report recently submitted to Governor A. Harry Moore at Trenton by State Highway Commissioner E. Donald Sterner.

The proposed new construction program calls for expenditure of $4,678,632 as strictly department projects, purchase of right-of-way and building of bridges; $3,038,000 as federal aid projects, under which the federal government pays half; and $4,100,000 as the state's share toward WPA projects. The latter item represents an increase over the $3,300,000 appropriated this year as the state's share of an approximate $25,000,000 program sponsored jointly with WPA.

Anticipated 1940 revenues totalling $46,169,000 are listed by Sterner as follows: Motor vehicle fees and fines, $20,005,000; motor vehicle inspection fees, $965,000; bus excise taxes, $85,000; motor fuel taxes, $23,000,000; federal aid, $1,519,000; miscellaneous receipts, $300,000. According to Sterner's report, however, these anticipated revenues will be reduced to $43,069,000 as the result of an anticipated $3,100,000 deficit for 1939 attributed to legislative relief financing action. A total of $2,000,000 of the 1940 highway funds already is earmarked for diversion to unemployment relief financing.

Initial part of a survey designed to provide a scientific plan for future New Jersey highway construction is nearing

completion, according to a recent announcement. The survey was conducted with the aid of the Federal Bureau of Roads.

Preparation of huge maps, dividing most of the state's counties into three sections, comprises the first step in the survey. Highway Commissioner Sterner said they have been prepared from airplane photographs and that they are the most comprehensive and accurate ever made of New Jersey.

Besides showing every road, railroad and waterway, they show rural dwellings, factories, schools, parks, bridges, golf courses and other outstanding landmarks.

Plans also are about complete for a detailed traffic survey which will provide a full year's count on traffic on every mile of the state's 21,500 miles of highway. The count will be taken by "electric eyes," which will be installed at key points in the highway system.

Excavation Awarded on Parker Dam's Power Plant

Completion of excavation work required for the Parker Dam power plant, Parker Dam Power project, California-Arizona, has been provided for in a Government contract awarded to Clyde W. Wood of Los Angeles, California, on his low bid of $276,210.

This contract covers all the required excavation for the powerhouse, for the forebay at the inlet to the penstock tunnels, for the penstock outlet portals, and for the abutments for the bridge on the road to the powerhouse. The greater portion of the excavation and a portion of the concrete substructure for the powerhouse have been completed under a previous contract.

The Parker Dam power plant will consist of four main generating units, each with a capacity of 30,000 kilowatts. The four tunnels and the penstocks conveying the river water from the forebay at the west end of the dam down to the power plant's turbines are 22 feet in diameter and have a water capacity of 5,000 cubic feet per second. The hydraulic units operate under a head of about 72 feet. The estimated cost of the power plant, which is to be built of reinforced concrete throughout, is approximately $8,000,000.

Parker Dam, on the Colorado River 155 miles downstream from Boulder Dam where it forms the boundary between Arizona and California, is second of a trio of dams which effectively control the Colorado River for beneficial use. Built by the Bureau of Reclamation for the Metropolitan Water District of Southern California, Parker Dam will divert water into the Colorado River Aqueduct for use by Los Angeles and 12 other cities in Southern California, and in addition will generate power for the District and for irrigation pumping requirements.

The contractor is required to complete the work covered in this award at the following specified times: the excavation for the powerhouse, penstock outlet portals, and bridge abutments and preparation for the road to the powerhouse within 135 days; work on the forebay and tunnels within 225 days; and the remainder of the work within 300 days.

Pit River Bridge Construction Started

Work will begin this month on the highest double-deck bridge in the world, in fulfillment of a contract awarded by Secretary Ickes, covering the construction of concrete piers and abutments for the Pit River Bridge, one of the chief features of the Central Valley Project, California.

The Union Paving Company of San Francisco, California, was awarded the contract November 6, on its bid of $1,138,288, which was the lowest of ten proposals received and opened by the Bureau of Reclamation at its Sacramento, California office.

This huge Pit River Bridge, to be almost 500 feet above the present level of the Pit River, will carry the relocated main line of the Southern Pacific Railroad and four lanes of U. S. 99 highway traffic across an arm of the future Shasta Reservoir 14 miles north of Redding, California.

The four abutments and 10 piers covered in this contract will form the substructure of the bridge, which will be a combination cantilever and truss

Just as a tight shoe hurts the foot, so a "misfit" groove in a sheave or drum causes damage to wire rope. In one case, comfort is sacrificed — in the other, economy.

The illustration below shows a sheave groove that has been worn down fully ½ of an inch. The worn part of the groove is narrower than was the original groove contour—due to the rope also having been reduced in diameter by wear. As the proper size gauge does not go to the bottom of this worn groove, a new full size rope put on this sheave in its present condition would be severely pinched and deformed.

You will get longer rope service, and therefore greater economy, by using sheaves and drums with grooves of correct design and size. They should be large enough for the wire rope to fit into them easily without binding on the sides, but not too large, as such a groove will not give proper support to a rope.

When grooves wear deeper and narrower . . . or when the tread becomes corrugated, they should be re-grooved. Oftentimes it will pay to install new sheaves.

Make it a rule to check your grooves for size and condition at regular intervals—and especially before putting on a new rope.

The recommended diameter of groove for any given rope is the nominal diameter plus a certain necessary clearance. Anything larger will not give adequate support to all ropes, and anything smaller will cause some ropes to be pinched.

These groove diameters for various size ropes are as follows:

NOMINAL DIAMETER (d)	PROPER GROOVE DIAMETER
0—3/4	d + 1/16
13/16—1-1/8	d + 5/64
1-3/16—1-1/2	d + 3/32
1-9/16—2-1/4	d + 1/8
2-5/16 & up	d + 3/16

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structure two-thirds of a mile long. Bids for the fabrication and erection of the steel superstructure are expected to be advertised soon.

The Government will furnish cement, sand and gravel for the manufacture of 95,000 cubic yards of concrete, and also 11,000,000 pounds of steel reinforcement bars that will go into the substructure. The contractor is to furnish lumber for forms, construction equipment and labor. The job also will include 276,000 cubic yards of excavation and 380,000 cubic yards of backfill.

The tallest pier will be 358 feet high and 95 by 90 feet in size at the base. Another pier will be 356 feet high and 95 feet square at the base, and a third 271 feet high and 72 by 58 feet at the base. The concrete in these three largest piers will be artificially cooled by the circulation of river water through metal tubing embedded in the structures, a practice developed by the Bureau of Reclamation and heretofore used only in the construction of giant dams.

The four abutments include two for the railroad, which is to occupy the lower deck, and two for the highway which will have curbed approaches leading to the upper deck. The main abutment at the southerly end of the bridge will be monolithic with the north portal of a half-mile railroad tunnel through Bass Hill. The tunnel, one of 12 on the 30-mile railroad relocation now under construction between Redding and Delta Station, was recently holed through.

50 Billions for 1960!

Expenditure of $50,000,000,000 will be required on the street and highway construction and reconstruction program which will be necessary to safely accommodate 1960's 40,000,000 motor vehicles, Paul G. Hoffman, president of the Automotive Safety Foundation and head of the Studebaker Corporation, told the annual convention of the American Institute of Steel Construction which concluded October 18 at the Hotel Waldorf-Astoria, New York City.

Hoffman estimated that $25,000,000 will be required to provide the 25,000 miles of super highways which will be needed outside cities, and that at least a similar sum will be needed to make a good start toward modernizing street facilities within cities. This job will take at least 20 years, he stated.

Such a street and highway improvement program will be necessary, Hoffman declared, because instead of 250,000,000,000 vehicle miles yearly from 30,000,000 cars and trucks, the total in 1960 will be 500,000,000,000 miles for 40,000,000 vehicles.

Breymann Acquired by G. L. D. & D. Co.

Great Lakes Dredge & Dock Company of Chicago has taken over the M. A. Breymann Dredging Company of East Boston, Massachusetts, and has also acquired the Breymann contract for dredging in the Cape Cod Canal.

OBITUARIES

John Stephens

The construction and quarry industry of Canada will learn with regret the sudden passing of John Stephens, for many years supervisor of quarry operations at the Dundas Plant of the Canada Crushed Stone Corporation, Limited.

Mr. Stephens, of splendid physique and apparently in excellent health died suddenly October 30 after a gall bladder operation.

"Jack" Stephens, as he was known to his many friends, was actively engaged in construction work in Canada for many years. In 1919 he entered the employ of Hagersville Contracting Company, now merged with the Canada Crushed Stone Corporation, as master mechanic and after seven years of faithful and satisfactory service, he was moved to the Dundas Plant, where his skill as a skilled mechanic had full scope. He was a past master in this sphere and his uncanny ability to solve the many troublesome problems that are peculiar to quarry operations and his driving force when major repairs had to be made, made him an outstanding figure in his sphere of life. He was a capable operator and supervisor of quarry operations and the very efficient and up-to-date electrification and haul-

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age system in use at the modern Dundas plant are in no small measure due to his skill and ability.

Left to mourn his sudden passing, are his wife Ferna Wills, a daughter, Mrs. E. Fallstrom, London, Ontario, and two sons, Rutherford and Anthony of Kirkland Lake, Ontario, and a host of friends and acquaintances.

H. H. Chambers

H. H. "Jack" Chambers, Western Sales Manager of Caterpillar Tractor Company, died at Peralta Hospital, Oakland, California, Saturday, October 21, after a lingering illness. He was 47 years old.

Death came as a distinct shock to Mr. Chambers' host of friends and business associates. His long service with "Caterpillar" had taken him to all parts of the United States, and had given him a wide and intimate acquaintance among leaders in construction, logging and agriculture. His keen wit, hearty laugh and remarkable memory for names, faces and incidents contributed to make him one of the most popular men in the industry.

The biography of "Jack" Chambers is one of a life distinguished by self-education, perseverance and a courage and honesty that took him steadily to a high place in the "Caterpillar" organization and earned him the esteem that only an executive whose "word is his bond," can win.

Homer Howard Chambers was born at Raymond, Illinois, the son of Joseph Melvin and Carrie Denson Chambers, June 26, 1892. Spending his boyhood days in Illinois, he came to the Holt Manufacturing Company, "Caterpillar" predecessor at Peoria, Illinois, in December, 1914, obtaining employment in the shop. His ability soon attracted the attention of his supervisors and from his factory job he was transferred to the company's service department.

When this country entered the World War, the Holt Company became a beehive of activity and one of the principal centers of its kind in supplying tractors for war service. U. S. Ordinance staffs were sent to the Peoria factory, and Mr. Chambers was assigned, on the department's payroll, as an instructor at Camp Herring, as the military quarters adjacent to the plant were known.

During his service as instructor in 1918, Mr. Chambers taught generals and enlisted men alike, the intricate details concerning the construction and maintenance of track-type tractors. The proficiency with which he did this work was soon to be rewarded, for after the war's end, Mr. Chambers was promoted to assistant service manager, and in 1921, became service engineer.

Accepting a partnership in the Milwaukee, Wisconsin, "Caterpillar" distributorship, Mr. Chambers resigned his position with the company in 1925, but returned three years later to take an important assignment in the company's sales department. A year later, he was named sales manager of the western division with headquarters at San Leandro, California, the position he held until his death.

Mr. Chambers and Miss Mary Alloway of Peoria, Illinois, were wed at Peoria in 1918. She, and one daughter, Miss Jeane Chambers, a student at Stanford University; a sister, Mrs. W. T. Schwertfeger of Mt. Olive, Illinois, and a brother, L. L. Chambers of Harvel, Illinois, survive the deceased.

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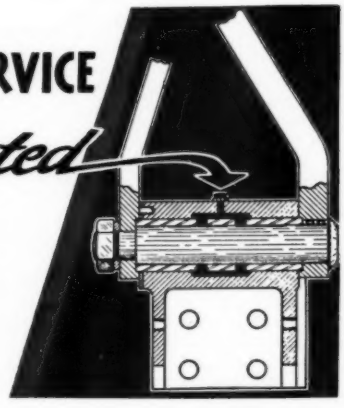

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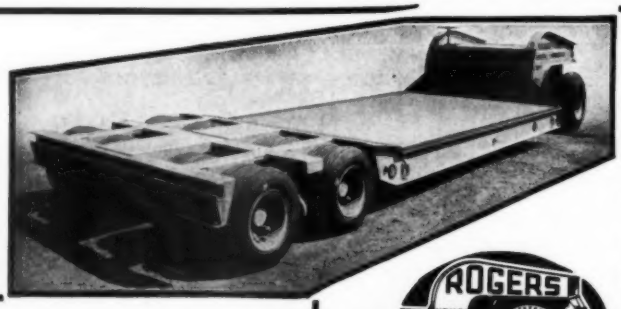

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Trade notes

Of interest to all producers of sand, gravel, crushed stone, or ready-mixed concrete are the coming St. Louis conventions.

On January 17, 18 and 19 the National Sand and Gravel Association will hold its twenty-fourth annual convention. St. Louis will also play host to the tenth annual convention of the National Ready-Mixed Concrete Association on these same dates.

Following these two conventions the National Crushed Stone Association convention will be held on January 22, 23, and 24.

All producers, irrespective of association membership, are invited to attend these conventions to see the latest in machinery and equipment, to hear the speeches of outstanding figures in the industry, and to enjoy the many top-notch entertainment features now being planned.

Changing trends in its business has led the Armco Culvert Manufacturers Association, Middletown, Ohio, to adopt the new name of Armco Drainage Products Association.

The Association was first formed in 1904 and recently held its 36th annual meeting at Ashland, Kentucky. Organized two years before the introduction of Armco "pure iron" by The American Rolling Mill Company, at a time when corrugated pipe was in its infancy, this Association has paralleled the growth of the highway and railway transportation industries which it serves. It has raised the position of the corrugated pipe from that of "wrinkled tin" to that of a highly respected modern drainage tool used under the most severe service conditions.

Officers of the Association are: W. H. O'Neall, president; H. W. Force, vice-president; M. F. Shelt, secretary-treasurer. The headquarters staff at Middletown is headed by S. R. Ives, vice-president and general manager; M. C. Patton, assistant manager; G. E. Shafer, chief engineer, and W. H. Spindler, publicity manager.

Caterpillar Tractor Company has announced the appointment of V. H. (Vic) Wallace as Western Sales Manager. Mr. Wallace succeeds the late H. H. Chambers, and will have his headquarters in San Leandro, California.

Victor H. Wallace was born in a small Ohio town in 1895. When he was six years old, he moved to Fresno, California, where his schooling was completed. After various small jobs there, he took the position of Advertising Salesman, and then Advertising Manager for the "Fresno Republican."

Mr. Wallace left the "Republican" to take a position on the staff of LaSalle Extension University sales force. After a year there, he joined the "Visalia Delta" newspaper, as Business Manager.

In 1927, he became affiliated with "Caterpillar's" Advertising Department at San Leandro. He was almost immediately sent to Peoria, Illinois, as Assistant Advertising manager at that office. He was there for 5½ years, and in January, 1933, was transferred to the Western Sales Division as District Representative. In that capacity, he headquartered briefly in Los Angeles, and then worked out of San Leandro, taking the territory as far north as Vancouver, B. C.

In 1935, Mr. Wallace was appointed Agricultural Sales Manager of the Western Division, with headquarters at Spokane, Washington. He continued in that capacity until November, 1938, when he was transferred to San Leandro, to act as Assistant Sales Manager, which position he held until the time of his latest appointment.

John A. Roebling's Sons Company of Trenton, New Jersey, manufacturers of wire and wire rope, insulated wire and cables and wire cloth and netting, announced the removal of its New York City offices on November 1, 1939 from 107 Liberty Street to the twentieth floor of 19 Rector Street.

The Four Wheel Drive Auto Company of Clintonville, Wisconsin, was among the leading motor truck manufacturers of the country who displayed their latest creations at the sixth annual National Motor Truck Show held in Chicago at the Navy Pier from November 8 to 16.

During the show, FWD also exhibited at its Chicago branch, 2100 South Wabash Avenue, one model of every FWD in current manufacture, ranging from the Model HS with a gross rating of 13,000 pounds to the powerful Model MJ6x6 six-wheel drive truck. Included in this line of trucks are units for every type of highway work, as well as fire fighting units, trucks for line construction and maintenance, and for heavy hauling in the oil fields.

Of special interest among the fleet of FWDs shown at the Chicago branch was an FWD Model M-10 with 8 cubic yard earth hauling body, and incorporating the new FWD designed and built transmission for "M" series trucks. Of the amidship, helical gear type, the transmission may be completely disassembled and reassembled without removing the unit from the truck. Among other outstanding features of the transmission is its ability to handle a higher torque motor than any other commercial truck transmission.

Construction of a fully modern proving grounds for the testing of motor trucks produced by the International Harvester Company on a tract of land southeast of Fort Wayne, Indiana, was recently announced by C. M. Harrison, superintendent of the Company's Fort Wayne Works. The program will consist of an extensive modernization and expansion of the proving grounds which the Company has maintained in Fort Wayne for some years. The expansion program has been engineered and planned exclusively to provide grueling tests for motor trucks.

A contact for construction of the track was let to the Indiana Engineering & Construction Company of Fort Wayne. The contract included all grading, paving, and other construction work incidental to the building of the track.

The new track, 6,200 feet—approximately 1¼ miles in length, is located on the south side of Oxford Street, between Wayne Trace and Meyer Road, about one half mile beyond the city limits. The track is about one half mile south of the Harvester Company's Fort Wayne Works.

Koppers Rheolaveur Company has been awarded a contract for approximately $160,000 by The Koppers Coal Company to provide the first unit of a coal washing plant at the company's new mine at Kopperston, Wyoming county, West Virginia.

The unit consists of a Menzies Cone Separator, 10 feet in diameter and capable of washing approximately 175 tons of three by three-eights inch coal an hour.

This initial unit is being designed to permit the installation of additional washing equipment as the mine developes.

An aerial tramway system also will be installed to dispose of refuse from the washing plant and lower tipple.

Construction will be completed in about four months.

Bucyrus-Erie Company announces the appointment of J. F. Tait as District Manager of their Pittsburgh Sales District with offices at 1502 Clark Building, Pittsburgh, Pennsylvania. Mr. Tait has been associated with Bucyrus-Erie for 22 years and prior to this appointment was in charge of the Philadelphia office, serving there as an Assistant Manager for the Eastern Sales District. At Pittsburgh he succeeds P. B. Heisey, who resigned to enter business for himself.

The Novo Engine Company, Lansing, Michigan, has just appointed Emerson Hail as manager of the Chicago, or midwestern, territory, with headquarters at 1406 Elmwood Avenue, Evanston, Illinois.

Mr. Hail is a graduate engineer with several years of practical experience with one of the largest mid-western contractors where he had full charge of several of the biggest engineering projects along the Mississippi valley.

His territory will include Illinois, Wisconsin, Missouri, Kansas, Nebraska, and North and South Dakota. He is now making his first swing in his territory contacting all of the Novo Distributors.

Rebuilding the Mohawk Trail

(Continued from page 714)

a concrete retaining wall about 150 feet long was built.

The channel of the brook was cleared and deepened, the bridge approaches built up, the bridge steel erected and a temporary wooden deck put on the bridge to handle traffic for the remainder of the winter.

In the spring a permanent deck slab was poured, together with the sidewalks, curbings, etc., after which the bituminous road surface was applied, railings were erected and the channel bank riprap placed. A temporary bridge which had been hastily thrown across the brook before C. J. Maney Co., Inc., arrived on the scene was maintained during the construction of the new bridge and finally removed once the new structure was opened to traffic.

The concrete used in the construction of this bridge over Davis Mine Brook was entirely ready mixed. The 301 Koehring crane did most of the concrete excavation, after the old structure had been broken up by jackhammers, and handled most of the miscellaneous crane work on the job. One of the 33-B Bucyrus-Erie shovels was used for channel excavation and a 32-B Bucyrus-Erie crane placed the rip-rap.

Floods, fires and other catastrophies often spare the very objects which most of us would expect to be among the first to be destroyed. Of course, there were numerous freak instances of one kind and another in the New England flood and hurricane of September, 1938, but one of the most amazing, from an engineering point of view, happened right at Charlemont.

This bridge, a solid and comparatively modern reinforced concrete structure over a little brook was utterly demolished, while another bridge, less than a mile away, a rickety old covered three-span wooden structure across the Deerfield River came through the flood practically unscathed except for a few holes punched in its sides by floating debris. Local traffic was detoured across this old covered bridge while C. J. Maney Co., Inc., was making the road through the Cold River valley passable.

Company Personnel

The C. J. Maney Co., Inc., which has built many highways and bridges in New England and has done a large amount of heavy foundation work in the vicinity of Boston, is personally headed by C. Joseph Maney, President and Joseph F. Carven, Sr., Vice President. William C. Maney, son of the President, and Joseph F. Carven, Jr., son of the Vice President, are both active in the operations of the firm.

The Superintendent on both the Mohawk Trail and Charlemont Bridge jobs was Mike Taurasi. Albert Rockwood acted as Assistant Superintendent; Joseph Cunning, General Carpenter Foreman; John Lannon, Master Mechanic; and Albert Fleming in charge of the job office. The task which these men accomplished speaks for their ability and loyalty. Each one, together with all the other employees, had a tough job under discouragingly unfavorable working conditions . . . and each one gave a good account of himself.

The Commonwealth of Massachusetts, Department of Public Works is owner of both the highway and bridge. William F. Callahan was Commissioner of Public Works; George H. Delano was Chief Engineer of the Department of Public Works; William Burns was District Highway Engineer; and Hugh Corr was Resident Engineer.

FOR SALE

RATES: 60c per line—minimum charge $2.40. Repeat insertions with no change in copy—three insertions for the price of two. ¶ Display advertising in this section at published display advertising rates. ¶ Estimate 41 characters per line, counting all spaces and punctuation as one character each. Allow ten characters for box number for blind advertisements. If address given, counts same as advertising copy. ¶ Rates are net (no commission, no discount) and payable in advance of publication. Send your remittance with insertion order and copy. ¶ Closing date—15th of preceding month. Example—January issue closes December 15.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

SMALL SHOVELS, CRANES AND DRAGLINES
Up to 2½ Cubic Yards

QUICKWAY 25' BOOM TRUCK CRANE. International P-30 truck. Front tires 2-20" x 9". Rear 4-36" x 8" Single axle. ½-yd. Blaw-Knox Clamshell bucket. Approximate weight 19,000 lbs. Good condition. Located Kentucky. Box 2428

BUCYRUS-ERIE 10-B Gasoline Shovel. Electric starter. Operating condition. Reasonably priced. Located Northern Minnesota. Box 2432

BUCYRUS-ERIE MODEL 1030 Gas 40' boom Clamshell machine including Blaw Knox 611 ¾-yard clam bucket. Good operating condition. Located Kentucky. Box 2438

BUCYRUS-ERIE Type B High Lift ¾-yard steam shovel. Operating condition. Located vicinity Boston. Box 2401

THEW-LORAIN—Model 60 gas shovel, with 1-yard dipper. Recently overhauled. Located northeastern New Mexico. Owner will sell cheap. Box 2424

BUCYRUS-ERIE 10-B Gas Shovel. Hercules JXA engine. 14" cat treads. Recently rebuilt. Located Kentucky. Box 2437

LORAIN 75-D gasoline combination 1¼-yard shovel and 70' boom dragline. Waukesha engine. Caterpillar extension included. Kohler light plant. Operating condition. Located Boston. Box 2391

BUCYRUS-ERIE 10-B Gas Shovel. Hercules JXA engine. 14" cat treads. Good operating condition. Located Kentucky. Box 2439

P&H MODEL 400 GASOLINE SHOVEL. Waukesha engine rebuilt late 1938. Machine generally good condition. Located Arkansas. Box 2285

BAY CITY GAS TRACTOR TYPE SHOVEL AND DRAGLINE—¾-swing. Extensively repaired. Located Pittsburgh. Box 2286

P&H MODEL 300-B GAS SHOVEL AND DRAGLINE. Used very little. Excellent condition. Located Southern Michigan. Box 2436

BUCKEYE. Combination ½-yd. Gas Shovel and 30' boom dragline including ½-yd. Page drag bucket. Shovel equipment practically new. Entire machine rebuilt two years ago. Very good condition. Located Indiana. Box 2430

BUCYRUS-ERIE 41-B 1¼-yd. Steam Shovel. Boiler ASME and Massachusetts standards. Very good condition. Located Southern Ohio. Box 2429

NORTHWEST No. 5. Combination 1¼-yd. Gas Shovel and 55' boom Dragline, including 1-yd. practically new ESCO drag bucket. Twin City 100 h.p. engine. Good running and operating condition. Located New Mexico. Box 2431

LORAIN-40 Gas Shovel. Electric starter. Waukesha engine. Located North Carolina. Box 2267

BUCYRUS-ERIE 43-B Gas shovel. 23' boom, 17' dipper handle, 1½-yd. dipper. Chain crowd. Electric starter. Wisconsin 6-cylinder 6"x7" Model E engine. Extensively repaired. Excellent shape. Located vicinity Boston. Box 2257

MEAD-MORRISON gas ⅝ yd. shovel. Buda 4 cylinder model YTU engine. Operating condition. Located central Wisconsin. Box 2303

BUCYRUS-ERIE B-2 1 yd. steam shovel. Operating condition. Located vicinity Detroit. Box 2305

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BUCYRUS-ERIE 1020 Gasoline 35' boom Clamshell and Dragline. Located San Francisco. Box 2407

BUCYRUS-ERIE 52-B Diesel Dragline. 80' boom. No bucket. Long and wide cats. Kohler light plant. Atlas engine. Located Southern Indiana. Box 2433

BUCYRUS-ERIE 55-B High Lift Diesel Shovel. 2¼-yd. all welded dipper. 1½ KW Kohler light plant. Atlas engine. Excellent mechanical condition. Located near Pittsburgh, Pa. Box 2434

BUCYRUS-ERIE 41-B — 1¼-YARD STEAM SHOVEL. Located near Boston. Electric light plant. Very good price. Box 2389

LORAIN 75—1¼-yd. Gasoline Shovel. Good working condition. Located near Chicago. Box 2423

LIMA 801—70' boom Dragline. 3-cu. yd. drag bucket. Powered by Hesselman engine. Good operating condition. Located Southern Illinois. Box 2419

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom, 18'4" dipper handle. 1½ yd. dipper. Waukesha 6¼"x8" 4 cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2313

KOEHRING MODEL 301. Combination shovel, and crane. Crane boom 40'. Shovel equipment ⅝-yd. capacity. Engine Wisconsin Model R.B. Rebuilt A-1 condition. Located Kentucky. Box 2403

MARION MODEL 381 2 yd. shovel powered by Hesselman engine. Good operating condition. Located northwestern Pennsylvania. Box 2304

P&H MODEL 400—Combination ⅝-yd. gasoline shovel and crane. Crane boom 35' plus 10' extension. Waukesha 4-cylinder 5"x6¼" engine. Located vicinity Boston. Box 2334

BUCYRUS-ERIE 50-B, 2-yd. steam shovel. Good operating condition. Located New York. Box 2333

BUCYRUS-ERIE D-2 — DIESEL DRAGLINE. Atlas engine. Located Texas. 40' Boom, 1¼ yd. Page Bucket. Field reconditioned. Excellent mechanical and operating condition. Box 2328

BUCYRUS-ERIE 30-B — Combination Steam Shovel and Crane; Shovel extra high lift; located in Chicago. Box 2425

KOEHRING MODEL 501 gasoline 1¼ yd. shovel. Wisconsin 6 cylinder 6"x7" engine. Electric starter. Extensively repaired. Good operating condition. Located Texas. Box 2302

LORAIN UNIVERSAL MODEL 35—Dragline— 28' boom. Waukesha 4½"x6" engine. Recently overhauled. Fine condition. Located California. Box 2290

BUCYRUS-ERIE 37-B Diesel dragline. New D-13,000 Caterpillar Diesel engine. Balance machine reconditioned. First class operating condition. New shovel equipment available at reduced price. Located Milwaukee. Box 2288

BUCYRUS-ERIE 19-B ⅝-yd. gas shovel. Good operating condition. Located Western Pennsylvania. Box 2399

BUCYRUS-ERIE 19-B gas, 35' boom dragline and ⅝-yd. AU drag bucket. Operating condition. Located Western Missouri. Box 2396

KOEHRING MODEL 1-A. Combination 40' boom crane and dragline. Gasoline. Wisconsin engine. Operating condition. Located near St. Louis. Box 2402

BUCYRUS-ERIE 1030—¾-yard Rope Crowd Shovel. Wisconsin B-3 engine. Substantial repairs made. Located Seattle, Wash. Box 2409

BUCYRUS-ERIE D-2—1¼-yd. Diesel Shovel. Atlas engine. Good operating condition. Located Seattle, Wash. Box 2410

BUCYRUS-ERIE 32-B—1-yd. Gas Shovel. Electric starter. Wisconsin M-3 engine. Operating condition. Located near Boston. Box 2422

BUCYRUS-ERIE 10-B Gasoline dragline. 28' boom. ⅝-yd. AU drag bucket. Now operating Missouri. Reasonably priced. Box 2397

BUCYRUS-ERIE 10-B Gasoline dragline. ⅝-yd. AU drag bucket. Hercules gasoline engine. Can be put right to work. Located western Missouri. Box 2398

P&H MODEL 150 ½-yard gas shovel. Operating condition. Located western Pennsylvania. Box 2400

MEAD-MORRISON ½-yd. gas shovel. Buda engine. Has had good care and is of good appearance. Reasonably priced. Located Southern Wisconsin. Box 2395

BUCYRUS-ERIE 45-B—45' boom Dragline 2½- yd. drag bucket. Buda Diesel engine. Good operating condition. Located Louisiana. Box 2421

BUCYRUS-ERIE 52-B—75' boom Dragline. Oversize cats. Atlas-Diesel engine. Good working condition. Located Nebraska. Box 2420

FOR SALE
1-yd. Northwest shovel—clamshell—dragline—hoe
½-yd. Bucyrus-Erie shovel—drag—clamshell
1-yd. P&H shovel—dragline—clamshell
1½-yd. P&H dragline—clamshell
EDW. M. ROCHO, Contractor, Freeport, Ill.

LARGE SHOVELS, CRANES AND DRAGLINES
2½ Cubic Yards and Over

3-W MONIGHAN — Late type walker, knocked down ready to ship; no power or bucket, some parts needed. As/is F.O.B. Los Angeles yard, $5,000. 2-W Monighan, good condition; no power or bucket. Price as/is F.O.B. Denver, Colorado, $4 000. Full descriptions either machine on request. BRODERICK & GORDON, 3901 Medford St., Los Angeles, Calif.

ANY FAIR OFFER ACCEPTED
BUCYRUS-ERIE—Class 24 steam dragline. 100 foot boom, 5 cubic yard bucket. Skid and roller mounted. Rebuilt 1927 at a cost of $15,000. New locomotive boiler installed 1928. Will accept any fair offer. Located near Fort Worth, Texas. Box 2390

MISCELLANEOUS EQUIPMENT

BUCYRUS-ERIE Scraper M-81—Single Cable Control. Capacity 7.2 cu. yd. Struck measure. 4-wheel 6 tires. Field reconditioned. For operation by 60 to 70 h.p. tractor. Located Oklahoma. Box 2418

BUCYRUS-ERIE Scraper M-81—4 Wheel 6 tires. Single Cable Control. Capacity 7.2 cu. yd. Struck measure. For operation by 60 to 70 h.p. tractor. Factory rebuilt. Located Indiana. Box 2417

BUCYRUS-ERIE Scraper Model H-74—2 wheel— rear dump. Capacity 6.69 cu. yds. Struck measure. For operation with 60 to 70 h.p. tractor. Factory rebuilt—guaranteed. Located Southern Wisconsin. Box 2416

LOCOMOTIVE CRANE—O&S 30-ton, steam— 8 wheels standard gauge—MCB truck. 75' boom. Located central Illinois. Box 2305

DRAG SHOVEL EQUIPMENT—For Bucyrus-Erie 1020 shovel. Located Rhode Island. Box 2332

ADAMS Model 48—22' endless belt elevating grader. First class condition. Located West Virginia. Box 2341

BUCYRUS-ERIE Scraper Model M-51—Single Cable Control. 4 wheel 6 tires. Capacity 4.5 cu. yd. For operation by 40 to 50 h.p. tractor. Factory reconditioned. Located Indiana. Box 2415

BURCH UNLOADER—Motor driven. 4 wheel rubber tired trailer. Located Indiana. Box 2411

DRAGSHOVEL EQUIPMENT FOR GENERAL EXCAVATOR. 18'6" boom—6' dipper handle—will cut 32" wide. Practically new. Located Connecticut. Box 2435

JEFFREY-BAKSTADT CRUSHER — 3 jaw, Single jaw primary, Two jaw secondary, all in one. Driven by 50 h.p. 3 phase 220 volt induction motor, including controls and belt. Approximate weight 27,000 lbs. New bushings and shaft recently installed. Reasonably priced. Located Western Pennsylvania. Box 2426

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EXCAVATING engineer
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TWO NORDBERG TRACK SHIFTERS MODEL S. Owner will test to see machines are in good condition. Located Southern Ohio. Box 2427

FOR SALE: 1 Mack truck with dump body; maximum load capacity 10,000; 1928 model. ELMHURST LUMBER & COAL CO., ELMHURST, ILLINOIS.

TRACKSON—CRAWLER WHEELS—Type 4C-W —15 ton. Only used for demonstration. Condition just like new. Attractive price. Located Milwaukee. Box 2387

1 6½-yd. Shovel, Bucyrus 320-B Electric
16 20-yd. Air Dump Cars, Magor, S.G.
4 20-yd. Air Dump Cars, Koppel, S.G.
36 5-ton Hand Dump Cars, Western, 36" ga.
1 1000 G.P.M. pump, 300' head, 100 H.P., 3/60/2200
1 700 G.P.M. pump, 200' head, 50 H.P., 3/60/2200
1 Mine Hoist with 200 H.P., 3/60/440 motor
1 Mine Hoist, steam or electric, 100 H.P., 3/60/2200
1 Compressor 750 C. F. M., I-R Imperial 10. Steam
12 Hoist motors, new, 50 H.P. and 25 H.P., 3/60/440
1 300 KVA Fairbanks-Morse Diesel engine generator, 3/60/480
1 170 KVA Fairbanks-Morse Diesel engine generator, 3/60/460
2 862 H.P. New Casey Hedges Longitudinal Tube boilers, never used.
Rails, Relaying, all sections; Cars, Hopper, Ore, Gondola, Tank, Flat, etc. Locomotives, all capacities and types.
Send for complete machinery bulletin!
IRON & STEEL PRODUCTS, INC.
13484 So. Brainard Ave. Chicago, Ill.

Faster-Bigger-New Diesel Powered DUMPTOR

—Powered with Diesel engine—hauls bigger loads at higher speeds—New, improved Koehring W-60 Model Dumptor, again cuts costs of moving dirt and rock. All important features of other Dumptor models are available with the new W-60. Three speeds forward or reverse—instantaneous gravity dump—constant mesh transmission—oscillating front axle—large pneumatic tires for maximum flotation—more than enough power, Diesel or gasoline, are only a few of the reasons why—dirt and rock are hauled at lower costs with Koehring Dumptors.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

Part of a large fleet of W-60 Dumptors hauling tunnel excavation on the Pennsylvania Turnpike.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

We sure keep our shovels busy and our trucks rolling with those Bucyrus Erie Blast Hole Drills on the job.
You, too, can keep your shovels busy and your trucks rolling with Bucyrus-Erie Blast Hole Drills. What's more, you can reduce production costs, because Bucyrus-Erie drills feature—
Quicker Moves
Faster Set-ups
High-speed Operation
Greater Drilling Force
Easier Tool Changes
Cheaper Maintenance
27-T, 29-T and 42-T — there's a size for every need. Investigate them today.
BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

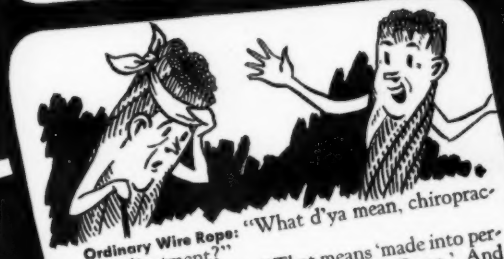
IF WIRE ROPE COULD ONLY *talk*...

Ordinary Wire Rope: "Don't you ever get tired?"
Macwhyte PREformed: "Naw. You see I come from a long line of famous strong back ropes, Macwhyte's the name. Being lubricated practically for life with a special lubricant, we Macwhytes have terrific resistance to internal friction and fatigue. Then, too, we're made of the finest steels."

Ordinary Wire Rope: "Oh-h-h, my back's about to break! I've been running in circles over sheaves and drums all day long. Oh-h-h . . ."
Macwhyte PREformed: "Buck up fella, you'll get over it. Where you working?"

Ordinary Wire Rope: "Gee, I'll bet you fellows live long, too."
Macwhyte PREformed: "Yes, we're pretty well known for our long life. You see at the factory before they let us go, we get a chiropractic adjustment and a thorough examination. Once they say OK to us, we're ready for a long life of heavy duty."

Ordinary Wire Rope: "On that shovel. Started this morning, and I'm all worn out. Say, you look like you never worked or worried. How do you do it?"
Macwhyte PREformed: "Me? Say, I work plenty, pal . . . been working on that job next to you for weeks. Night shifts, too. And I feel fine."



Ordinary Wire Rope: "What d'ya mean, chiropractic adjustment?"
Macwhyte PREformed: "That means 'made into perfect PREformed Macwhyte Wire Rope.' And believe me, brother, I earn money for the fellow who buys me...I'm built to take it."

MACWHYTE COMPANY, Kenosha, Wis. Manufacturers of wire rope and braided wire rope slings...New York...Chicago...Pittsburgh...Ft. Worth...Portland...Seattle...San Francisco...(Distributors throughout the U. S. A.)

NO. 421

MACWHYTE

Whyte Strand – PREformed WIRE ROPE

For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

THE RIGHT OIL FILM HELPS SHOVELS M

AND COMPLETE CLOSE

Winter... tough operating conditions... costly breakdowns and delays—

Right now is the time for you to try the new Gargoyle Viscolite Oils!

These oils are specially made for heavy equipment. They flow readily on cold starts. Reduce leakage as well as form a tough adhesive film that clings tightly to metal and protects.

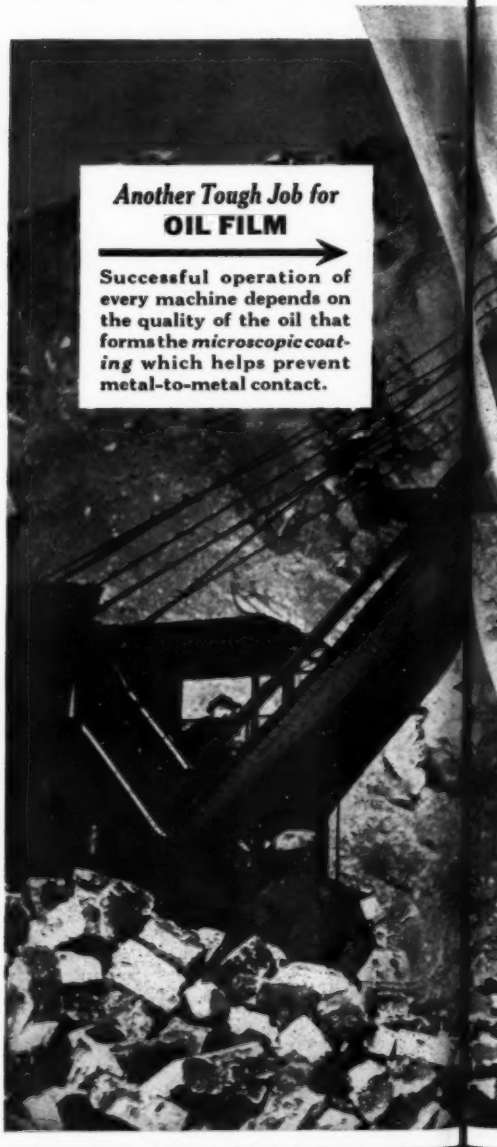
But let Gargoyle Viscolite Oils prove their value... right on your present job!

THE SOCONY-VACUUM man offers you a complete line of lubricants, plus these *exclusives:*

The right lubricant for every machine . . . and new lubricants ahead of new needs . . . developed by world-famous research laboratories through close cooperation with machine builders.

73 years' experience—thousands of case histories—to guide in prescribing the right use of these lubricants to gain Lubrication Profits for you.

World-wide distribution and guaranteed uniformity—the same quality available everywhere.


Another Tough Job for
OIL FILM
Successful operation of every machine depends on the quality of the oil that forms the *microscopic coating* which helps prevent metal-to-metal contact.

For your convenience in writing to Socony-Vacuum Oil Co., Inc., you will find a card bound in this issue.

ake Dirt Fly

EIGURED JOBS ON TIME!

SOCONY-VACUUM

Industrial Service and Lubricants Help to Lower Costs by

Correct Lubrication

GARGOYLE Lubricants

SOCONY-VACUUM OIL CO., INC.

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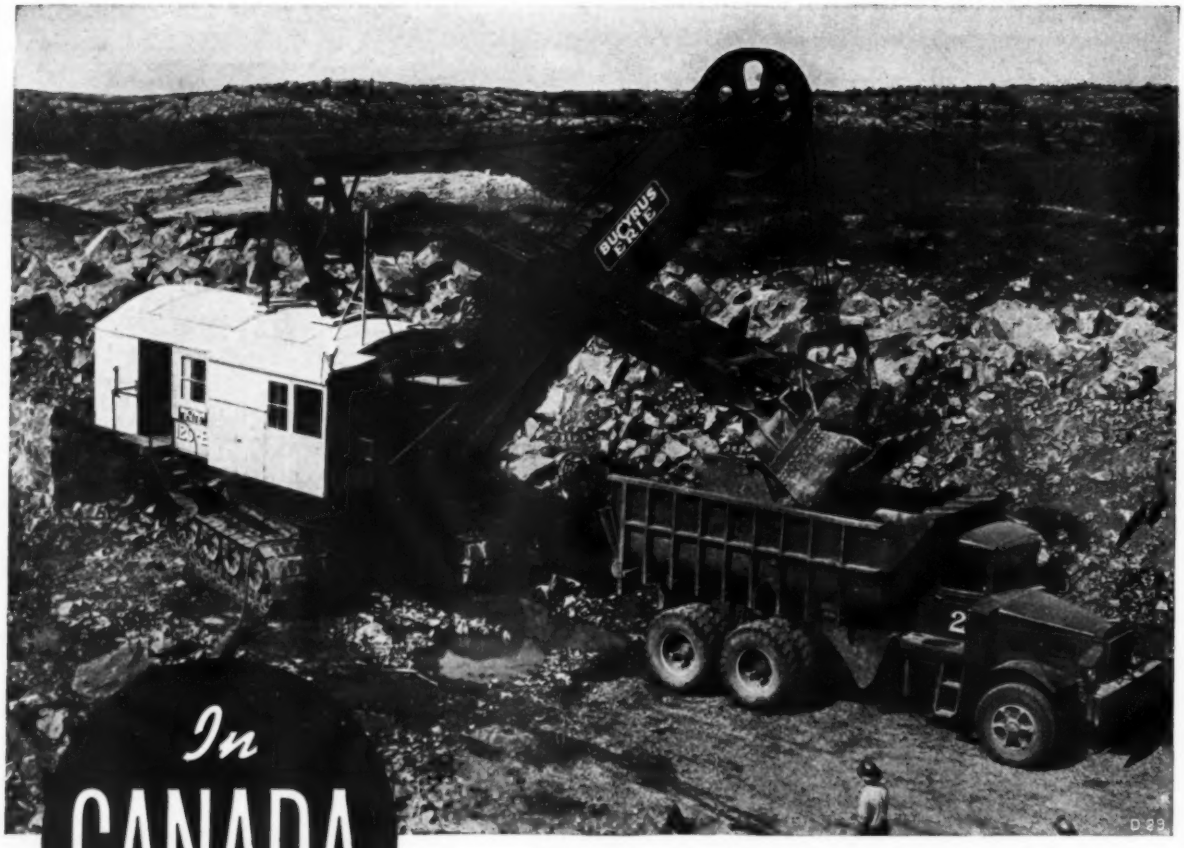

In CANADA

and wherever top performance is vital

YOU'LL find Bucyrus-Eries first choice in the great mining regions of the world — in the United States, Canada, Sweden, Chile, Russia — wherever big output capacity, low costs and dependable performance are vital.

Owners who check results carefully know that these "Years Ahead" machines are in a class by themselves. That's why there are more Bucyrus-Erie quarry and mining excavators sold than all other makes combined. That's why two of every three Bucyrus-Eries sold are repeat orders, the results of the fine performance of previous Bucyrus-Eries.

Illustrated above is one of the 120-B s owned by International Nickel Company of Canada, Ltd.

BUCYRUS ERIE

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

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EXCAVATING Bargain Counter

EVERY item on this page is priced for QUICK SALE. The equipment offered includes SURPLUS STOCK, REBUILT (carrying new equipment guarantee), and USED. Write or wire EXCAVATING ENGINEER, mentioning reference number. SAVE by filling your requirements from the BARGAIN COUNTER.

BOOMS

16'6" Chain Crowd Boom, 16-B	JA-38
18'6" Chain Crowd Boom, 21-B	JA-49
20'0" Chain Crowd Boom—48-B type for 34-B	JA-51
20'6" Shovel Boom—Steam H.L., 20-B New	JA-4
20'6" Chain Crowd Boom. 1030, New	JA-24
21'0" Steam Boom, 42-B	JA-54
21'6" Chain Crowd Boom, 37-B. New	JA-26
21'9" Steam Shovel H.L., 31-B	JA-5
23'6" Rope Crowd Boom, 37-B. New	JA-28
*24'0" Rope Crowd Shovel Boom, 43-B. New	JA-9
24'0" Erie type drag shovel boom, D-2	JA-52
26'0" Boom, Less shipper shaft brackets, 42-B	JA-53
26'0" Shovel Boom—High Lift, D-2	JA-13
26'0" High Lift Shovel Boom, 30-B. New	JA-36
*27'0" Rope Crowd Shovel Boom, 43-B. New	JA-16
28'0" Boom, 70-T, 70-C	JA-40
30'0" Steam Shovel Boom—H.L., 50-B	JA-18
31'0" Boom, 52-B	JA-41
35'6" Boom. H.L., 50-B. New	JA-43
150'0" Boom, Class 230	JA-44

DIPPER HANDLES

28'0" 80-B Dipper handle	H-28
46'0" 200-B Dipper handle	H-29

Asterisk (*) denotes more than one such item available.

DIPPERS

SMALL MACHINES

*½ cu. yd. 17-B Dippers	D-90
⅝ Yd. Plate front, 20-B Dipper. New	D-12
⅝ Yd. Plate front, 14-B Dipper. New	D-13
⅞ cu. yd. 32-B Dipper	D-72
⅞ cu. yd. 21-B Dipper	D-88
1 Yd. Plate front, 20-B Dipper. New	D-42
*1¼ Ins. tooth, 42-B, 41-B, E-2 Dippers. New	D-44
1¼ Yd. Dipper. New. 30-B, 42-B, 41-B, E-2	D-54
*1½ Yd. 34-B Dippers	D-74
1½ yd. Ins. tooth Dippers, 42-B, 43-B. New	D-55
2 cu. yd. 50-B Dipper. Used	D-69

LARGE MACHINES

2 yd. Vanderhoef, 75-B. New	D-79
*2¼ yd. Vanderhoef, 75-B. New	D-78
*2¼ yd. Vanderhoef Rock Dipper, 50-B, 52-B. New	D-75
2½ yd. Special Shallow Dipper, 50-B, 52-B, 55-B. New	D-89
3½ yd. Coal Dipper, 75-B. New	D-81
6 yd. Two part teeth, 200-B, 320-B, 225-B. New	D-11
8 yd. Two part teeth, 320-B Dipper. Used	D-6

Asterisk (*) denotes more than one such item available.

BUCKETS

DRAGLINE

1½ yd. Beco "AX," 3.200 lbs. Rebuilt	DB-37
1¾ yd. Beco "U," 3.250 lbs. New	DB-35
6 yd. Monighan "W," 12,500 lbs. New	DB-17
7 yd. Monighan "W," 13,700 lbs. New	DB-18
5 yd. Monighan, heavy duty, 10,000 lbs. Used	DB-16

CLAMSHELL

2 yd. PF Williams clamshell bucket without teeth and counterweight	CSB-1

DIPPER TRIPS

31-B steam dipper trip. New	DT-2
*42-B and E-2 dipper trips	DT-3
D-2 Erie type dragshovel dipper trip	DT-4

BOILERS

44"x17', 75 h.p. locomotive, 125 lb. working pressure A.S.M.E. std. Will fit 68-C	B-13
36"x82½" vertical boiler for type A Bucyrus-Erie machine	B-14

Asterisk (*) denotes more than one such item available.

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CONSTRUCTION ACCOUNTANT

Iowa Commerce Graduate would like contacts for a position in the accounting field with large construction or equipment concern. Possesses a knowledge of construction activities. References. Box 9137

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You will find the ADVERTISERS' INDEX on page 675.

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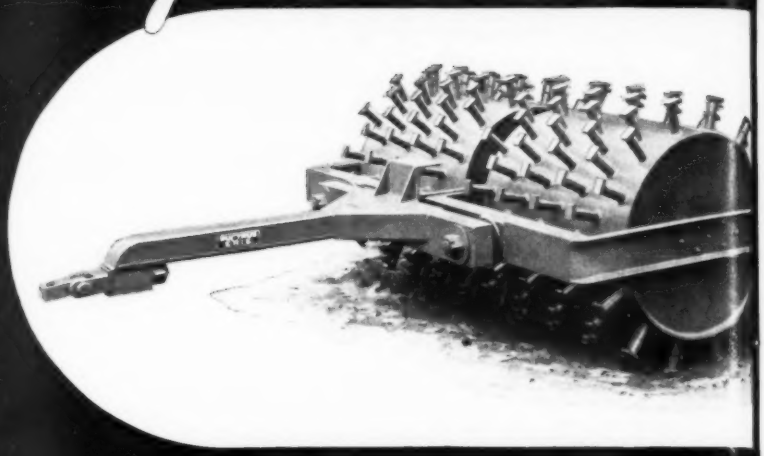

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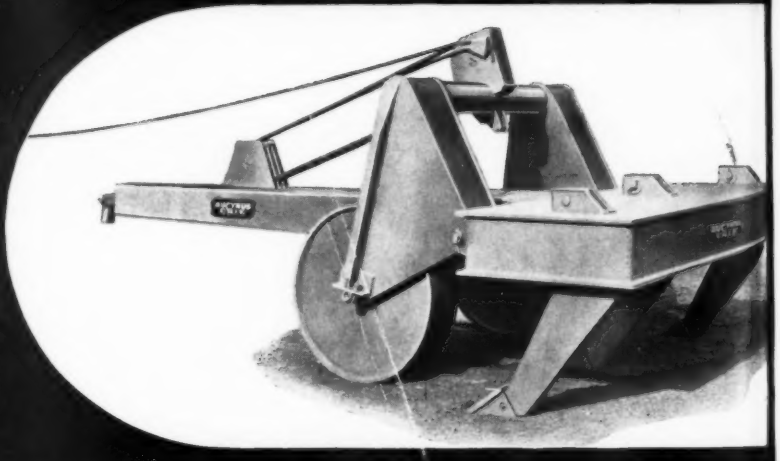

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